

**Hominy Swamp Creek Watershed Assessment
And Restoration Plan**

Submitted to
Region 4 US Environmental Protection Agency

Submitted by

Ecosystem Enhancement Program
North Carolina Department of Environment
and Natural Resources
December 2004



Hominy Swamp Creek Watershed Assessment and Restoration Plan

Submitted to Region 4 Environmental Protection Agency,
in Partial Fulfillment of Cooperative Agreement # CD984622-99
Contentnea Watershed Wetland and Riparian Area Restoration and
Plan, Neuse River Basin

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Ecosystem Enhancement Program
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Hominy Swamp Creek Watershed Assessment and Restoration Plan

1 Introduction

1.1 Background

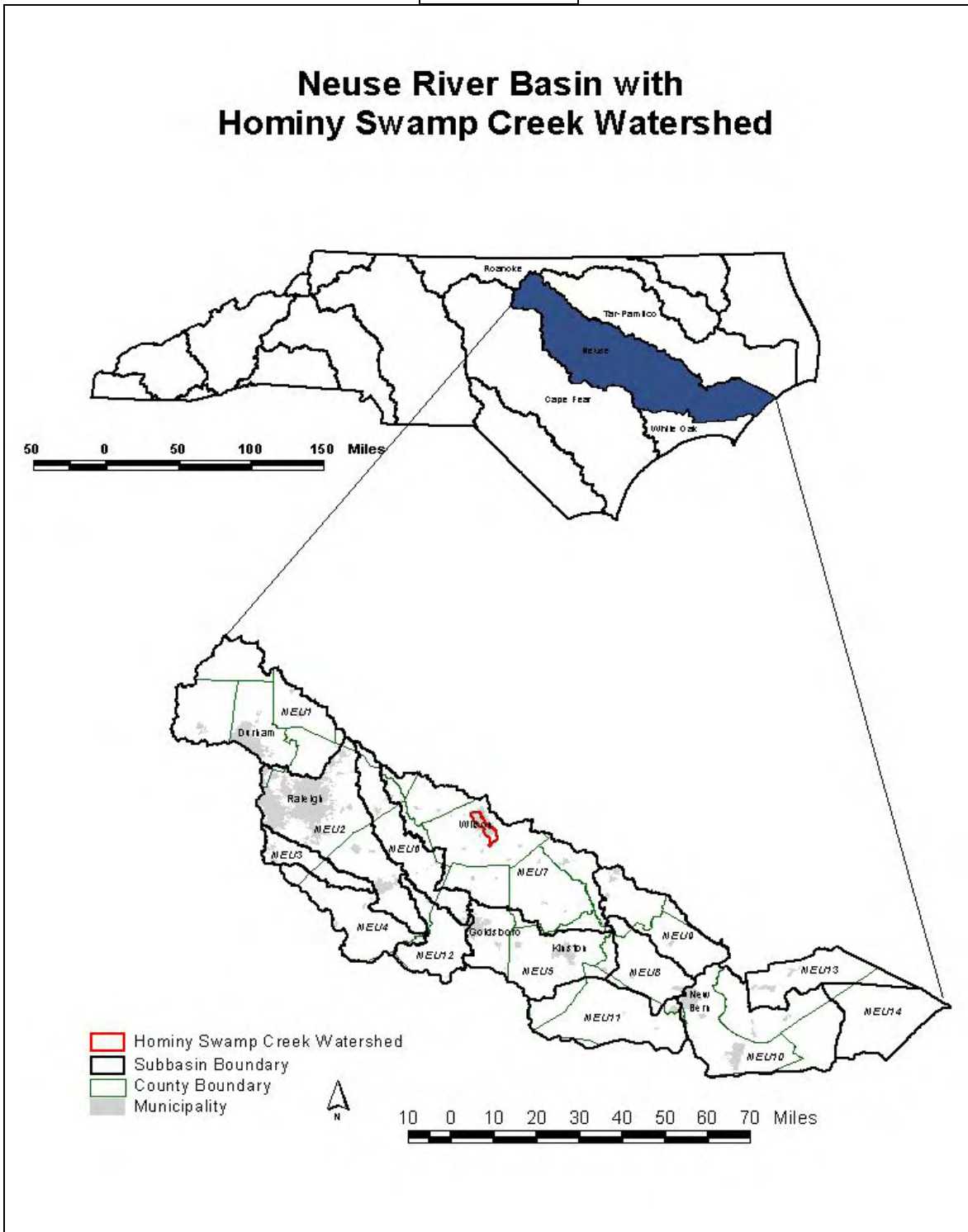
The North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP; formerly the NC Wetlands Restoration Program) received a grant from the U.S. Environmental Protection Agency (EPA) in 1999 to develop a watershed assessment and restoration plan for one or more 14-digit hydrologic units within the Contentnea Creek watershed (Subbasin 7 of the Neuse River Basin). Hominy Swamp Creek (HU # 03020203020040; Figure 1.1), in Wilson, NC, was selected for the study in part because there were obvious nonpoint source water quality problems, the watershed appeared to have need and opportunity for watershed restoration planning, and there were noted concerns about flooding and associated resource and financial impacts in the City. Natural resource agencies in the community (federal, state, and local) expressed a willingness to participate in the watershed planning process; a summary of local participation and watershed goals is presented in Appendix A. Components of the grant were developed between 1999-2004 and are incorporated in this assessment and restoration plan. Other elements and deliverables for the grant are summarized in Appendix C.

1.2 Project History

Earlier studies: The EPA grant was used to develop a watershed assessment and management plan for the upper portion of Hominy Swamp Creek (KCI, 1999), and a stream restoration project was implemented in Recreation Park (Figures 1.2, 1.3, 1.4) as a result of that assessment. Funding from the grant was also used to develop a land use/land cover characterization using high resolution satellite imagery (Center for Earth Observation, North Carolina State University, 2000). Further analysis on land use/land cover has been developed, through other funding, focusing specifically on the riparian corridor of Hominy Swamp Creek (Center for Earth Observation, North Carolina State University, 2003).

An advisory group was convened in 2003 to solicit input and assistance from local area natural resources agency staff. A number of issues were discussed during meetings with the advisory group, and a list of goals was developed, including water quality and habitat improvements, education, land use and open space planning, and identifying funding sources for projects. Some of these goals are being addressed by the local agencies, and can be enhanced through application of additional resources. A summary of the advisory group effort is provided in Appendix A; an analysis of funding sources is provided in Appendix B.

Figure 1.1



1.3 Watershed Overview

Hominy Swamp Creek is located in the City of Wilson, North Carolina. The City was founded in 1849 in a primarily agricultural region of the coastal plain, a local hub for several railway lines that transect the state. The population in the City since 1900 is summarized in Table 1.1.

Table 1.1 Summary of Population, City of Wilson, 1900-2000

Year	Population
1900	3,500
1950	23,00
1970	29,000
2000	44,000

The watershed area is comprised of approximately 15 square miles of land area that drains into the larger Contentnea Creek at the southern reaches of the watershed (Figure 1.2).

The stream system that makes up Hominy Swamp Creek has been extensively channelized over the past 50 years, and now serves mainly as storm water conveyance through the urbanized mid-portion of the watershed. Most headwater streams of the system are relatively undisturbed at present, but there is additional development pressure in the city as new residential and commercial developments encroach from the east and west. The mid and upper portions of the watershed have been largely built-out over the past fifty years, and there are many complaints of residential flooding as the creek attempts to access its historical floodplain.

1.4 Stakeholder Process

An advisory group was developed to help give guidance for the planning process. Three meetings were held during 2003 to solicit input and assistance from local area natural resources agency staff. The following groups participated in the meetings:

City of Wilson Stormwater Services
City of Wilson Public Services/Engineering
Wilson County Cooperative Extension Service
USDA Natural Resources Conservation Service (Wilson County)
Neuse River Foundation
Green Engineering (a local engineering contractor)

NC State University's Watershed Education for Communities and Local Officials (WECO) facilitated the meetings. The purposes of these meetings were to review assessment data and gather additional information, gather insight into local program priorities, to help set goals for the planning effort, and to assist in site visits. A public meeting was held in December 2003, to solicit input from the community. Meeting minutes are available on WECO's website at: www.ces.ncsu.edu A summary of goals discussed is presented in Appendix D.

Goals of Watershed Planning

There were a number of problems discussed during meetings with local resource agency staff. There was a rather exhaustive list of goals to work towards, including water quality and habitat improvements, education, land use and open space planning, and identifying funding sources for projects. Some of these goals are being addressed by the local agencies, and can be enhanced through application of additional resources. Below are listed objectives for this Local Watershed Planning Group, as discussed at meetings in 2003 :

- 1) Improve Water Quality
- 2) Restore Physical Habitat
- 3) Engage and Educate the Public & Government
- 4) Implement Land Use Planning
- 5) Encourage Community Stewardship
- 6) Develop Implementation Strategy
- 7) Identify Potential Funding Sources

2 Natural Resources

Wilson County lies mainly in the Inner Coastal Plain physiographic province of Eastern North Carolina. The terrain is dominated by gently sloping and flat coastal plain uplands, narrow to wide floodplains, and nearly level stream terraces (USDA, 1983).

2.1 Local Soils

Soils within the watershed are predominantly represented by nine soil series, further defined into thirteen separate mapping units as presented in Table 1.2. More than half of the dominant soils are classified as hydric; these soils exhibit characteristics of wetland and flood-prone soils. Hydric soils within the Hominy Swamp drainage are often poorly or somewhat poorly draining, subject to frequent flooding, and often have a seasonal high water table at or near the surface, or down to 18” below the surface. These soils likely formed in and are indicative of the swamp-like conditions under which this stream system functioned in the past, with the stream having easier access to a more extensive floodplain than now exists. Remnant hydric soils are one major factor indicating previous wetland areas, as well as potential wetland restoration and enhancement opportunities.

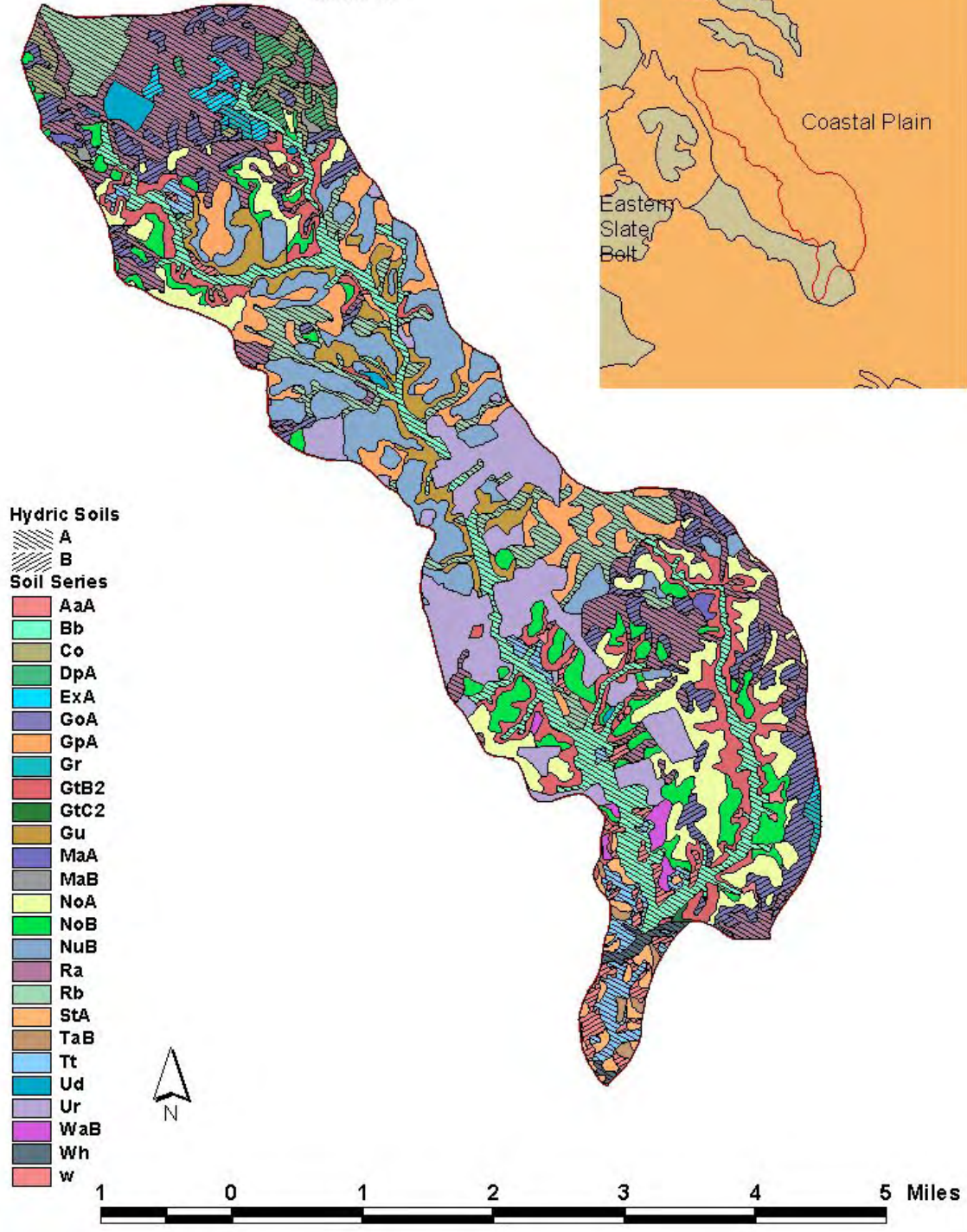
Table 2.1 Soils of Hominy Swamp Creek Watershed

Mapping Units	% present in watershed
<i>Hydric:</i>	
Bibb loam (Bb)	6
Goldsboro sandy loam, 0-2% slopes (GoA)	7
Rains sandy loam (Ra)	15.5
Rains urban land complex (Rb)	7
Tomotley fine sand loam (Tt)	7
Wehadkee & Chewacla loams (Wh)	11
<i>total</i>	53.5%
<i>Non-Hydric:</i>	
Goldsboro urban land complex, 0-2% slopes (GpA)	5
Gritney sandy loam, 2-5% slopes, eroded (GtB2)	5
Gritney urban land complex, 2-12% slopes (Gu)	2.5
Norfolk sandy loam, 0-2% slopes (NoA)	7
Norfolk sandy loam, 2-6% slopes (NoB)	4
Norfolk urban land complex, 2-6% slopes (Nu)	7.5
Ur urban land	8
<i>total</i>	39%

The majority of upland, non-hydric soils are Goldsboro, Norfolk and Gritney sandy loams and those representing an urban land complex (disturbed or modified, with some areas now impervious).

Figure 2.1
Local Soils,
Physiographic Region

Hominy Swamp Creek Soils



2.2 Habitat and Endangered Species

No known rare or endangered terrestrial or aquatic species occur within the Hominy Swamp Creek watershed (NHP, 2004). This does not indicate definitively that no such species exist in the watershed, but instead indicates that no studies have shown the presence of such species. There is one rare species known to have historical habitat outside of the watershed (but within Wilson County), as indicated by the NC Natural Heritage Program. This amphibian is the Neuse River Waterdog (*Necturus lewisi*), a species of State Concern.

While much of the watershed has been altered, mainly through channelization and increasing land development over time, there are still several highly functional wetland areas that bear consideration for protection. These areas have been identified through GIS analysis and site visits to be relatively unaltered, particularly in the headwaters and further down the mainstem, as indicated in the next section describing wetlands.

2.3 Wetlands

Analysis of current and historic wetlands features in the Hominy Swamp watershed were identified as the best means to look at watershed functions, addressing impacted functions and functions that merit protection. Data made available through the NC Division of Coastal Management (DCM) were used to assess existing wetlands (using wetland type data set) and the functions performed, represented as “ecological significance” (using NCCREWS data) as well as lost or degraded wetlands features (using potential wetlands restoration data). These facets of the data are examined in the following subheadings. *Note:* The data provided is for planning purposes only and not for jurisdictional determinations; further field assessments are recommended as necessary.

Existing Wetlands:

As seen in Figure 2.2, the watershed currently contains approximately 32% of its land area in wetlands. The majority of existing wetlands are riverine swamp forest (1,686 ac.), managed pine (704 ac.), and bottomland hardwood (443 ac.). The areas representing “managed pine” may be over estimated in this watershed and may more truly represent degraded wetlands (that have been transformed primarily into residential areas), retaining less capacity to function in biogeochemical cycling and floodwater retention than they may have in the past.

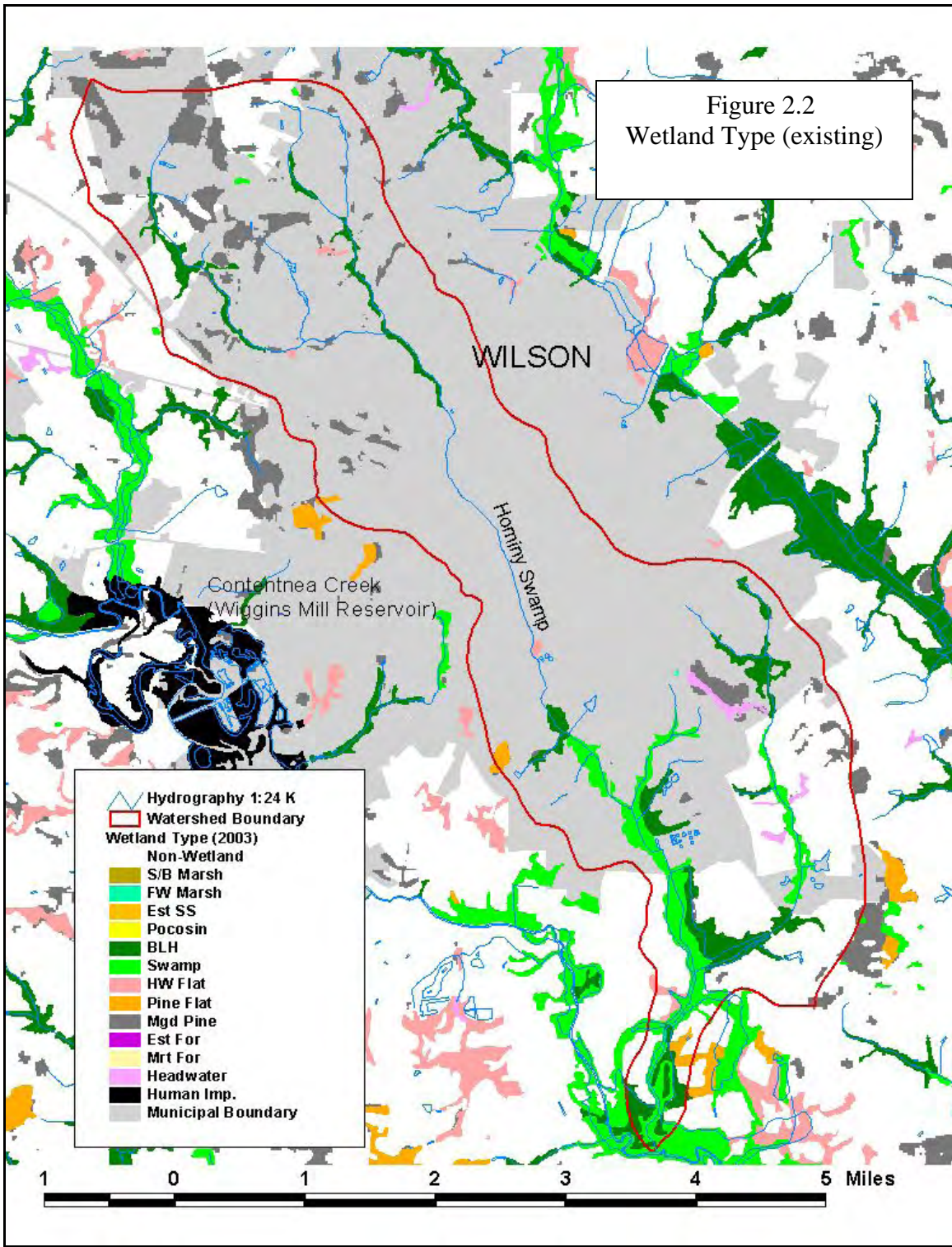


Table 2.2 Existing Wetland Type

Wetland type	acres
Bottomland Hardwood	443.7
Cleared Bottomland Hardwood	13.1
Cleared Depressional Swamp Forest	0.2
Cleared Hardwood Flat	4.2
Cleared Headwater Swamp	0.6
Cleared Pine Flat	0.3
Cleared Riverine Swamp Forest	1.2
Cutover Bottomland Hardwood	31.7
Cutover Depressional Swamp Forest	0.1
Cutover Hardwood Flat	6.0
Cutover Headwater Swamp	3.9
Cutover Pine Flat	51.9
Cutover Riverine Swamp Forest	14.8
Depressional Swamp Forest	13.6
Drained Bottomland Hardwood	40.1
Drained Hardwood Flat	4.7
Drained Riverine Swamp Forest	27.2
Freshwater Marsh	0.6
Hardwood Flat	16.6
Headwater Swamp	38.1
Managed Pineland	705.0
Pine Flat	19.3
Riverine Swamp Forest	1686.1
Total wetland acres	3122.9
Total watershed acres	9600

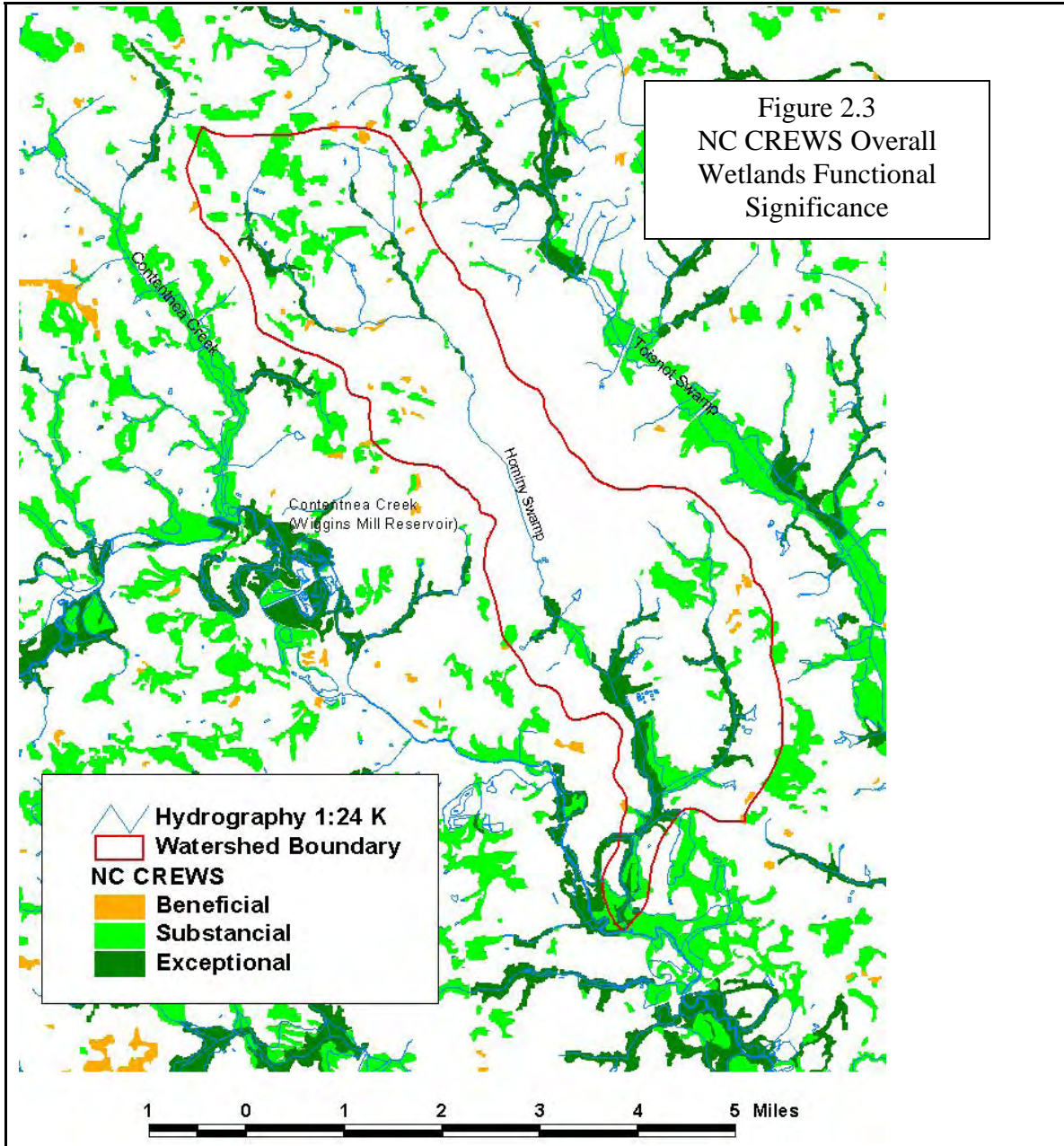
The NC CREWS data can be used to look at the ecological significance of existing wetlands and the roles they play in water quality, habitat, and hydrologic functions in the watershed (additional maps of NC CREWS data are provided in Appendix D). As stated in the DCM documents available for use with this data, “The Overall Wetland Rating (OWR) for wetlands is based on each wetland’s ability and opportunity to provide (1) Water Quality, (2) Hydrologic, and (3) Wildlife Habitat functions.

Exceptional Functional Significance: A wetland is rated exceptional for its overall functional significance when it performs water quality, hydrologic and/or wildlife habitat functions at well above normal levels. Specifically, a wetland is rated Exceptional when any two of the primary wetland functions (water quality, hydrology, and habitat) are rated Exceptional. Salt or Brackish marshes, estuarine scrub-shrub wetlands; estuarine forested wetlands; unique natural ecosystems or special wildlife habitat areas, wetlands located adjacent to primary nursery areas, and wetlands that contain threatened or endangered species are also rated Exceptional.

Substantial Functional Significance: A wetland is rated Substantial when the wetland performs the three primary wetland functions at normal or slightly above normal levels. A wetland is also rated Substantial if it is a buffer to a wetland rated Exceptional.

Beneficial Functional Significance: A wetland is rated Beneficial when it performs the three primary wetland functions at below normal levels or, in some cases, not at all. Although most wetlands perform a variety of wetland functions, all wetlands do not provide all functions. A wetland is rated Beneficial when any two of the primary wetland functions are rated low and none are rated high. Some jurisdictional wetlands may not perform some functions due to degradation or alteration, but may provide other functions at below normal levels.” (DCM, 2003)

As represented on Figure 2.3, wetlands of exceptional function, incorporating water quality, hydrologic, and habitat qualities, are present in this watershed, as well as areas of substantial functional capacity. Several areas with highly functional, intact wetlands systems are within the headwaters and in the lower reaches of the drainage area. Preservation of existing wetlands features is a main goal of this planning effort, as many wetlands features have been compromised over time, and development too close to and in the floodplain has caused major flooding events and heightened awareness of flood potential.



Lost and Degraded Wetland Features:

There are many ways of using the DCM Wetland Type and Potential Restoration and Enhancement data sets to look at historic wetlands loss (Figure 2.4). The potential wetlands restoration data set represents areas that were historically functioning as wetlands and have either been degraded to the point that they no longer provide wetland benefits to the watershed, or those functions have been partially compromised. Three potential wetlands restoration and enhancement types exist in this watershed, as summarized in Table 2.3.

Table 2.3 Potential Restoration and Enhancement Types

Potential Restoration Type	acres
Swamp/Bottom Land Hardwood	157.6
BLH/Headwaters	130.1
Wet Flatwoods	2022.3
total	2309.9

In accordance with guidance documents for these data, disturbance types are represented as drained, ditched, and managed pine. Drained and cleared wetlands and managed pine areas make up the majority of disturbance type within this watershed; type of disturbance is summarized in Table 2.4. Disturbance classes represent either restoration or enhancement potential; disturbance classes 4,5, and 9 represent enhancement potential, other classes represent restoration potential.

Table 2.4 Disturbance Classes

Type of Disturbance	Disturbance Class	acres
Drained and cleared	1	1393.4
Drained and cleared	2	3.1
Drained and cleared	3	6.7
Ditched, not cleared	4	72.9
Managed Pinelands	5	705.0
Drained, not cleared	8	50.0
Ditched, not cleared	9	79.0
total		2310.0

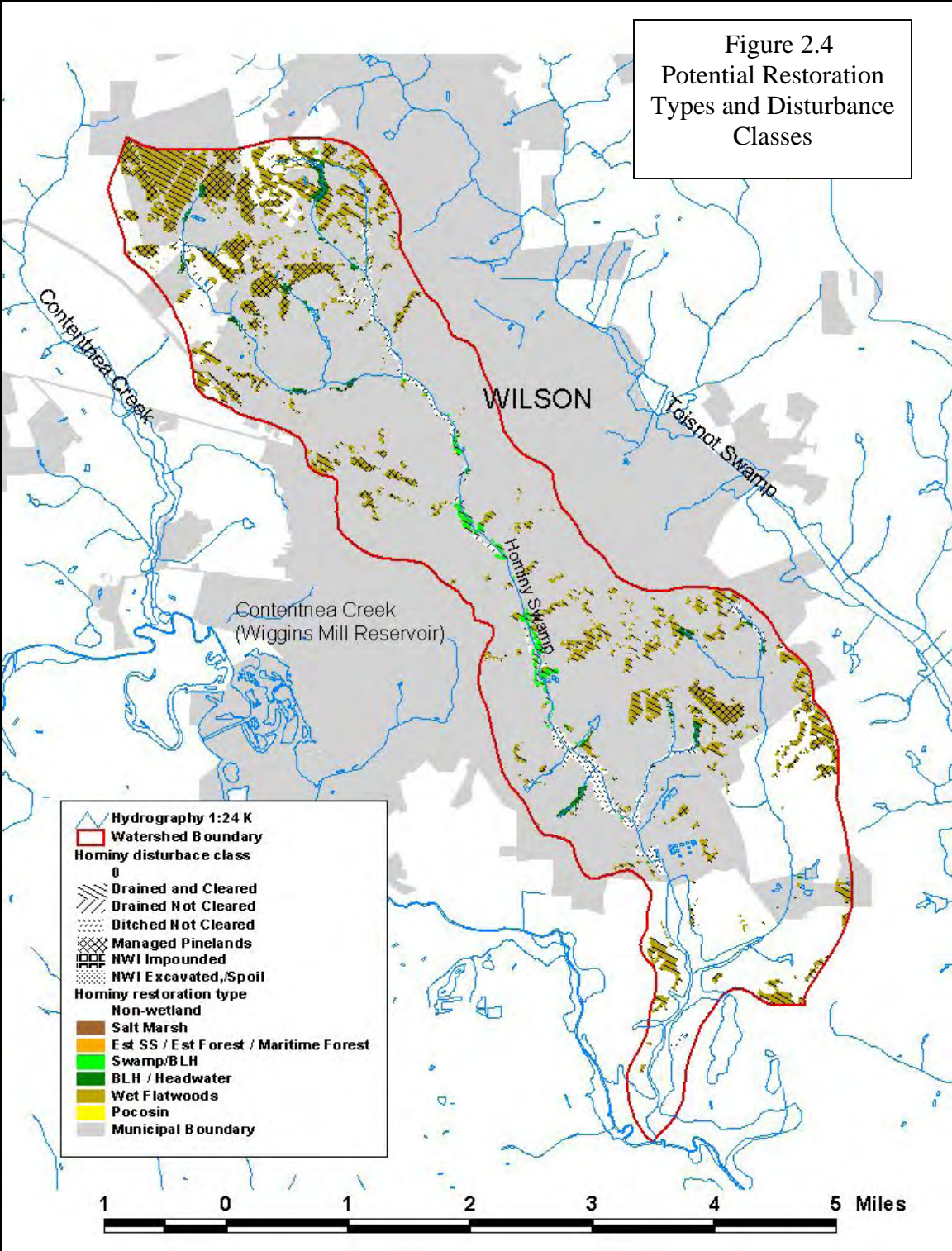
Several conclusions have been drawn from these data sets, as represented in summary:

Watershed area:	9,600 ac.
Existing Wetlands:	3,122 ac.
Historic Wetlands:	4,575 ac.
Potential Restorable Wetlands:	1,453 ac.

Existing Wetlands, as % of Historic wetlands	68%
Wetlands functional area lost, as % of historic wetlands acreage:	31%
Wetlands functional area degraded or lost, as % of historic wetlands acreage:	50%

With nearly half the functional wetlands lost or degraded over time, it should be no surprise that watershed functions have been compromised. While it may appear intuitive that the loss in hydrologic function of historic wetland areas would greatly affect the ability of the watershed to effectively assimilate floodwaters, it is a difficult proposition to restore that function in a natural manner in a developed watershed. For this reason, consideration was given to replacement of lost functions in the most appropriate methods given the constraints of current land use.

Figure 2.4
Potential Restoration
Types and Disturbance
Classes

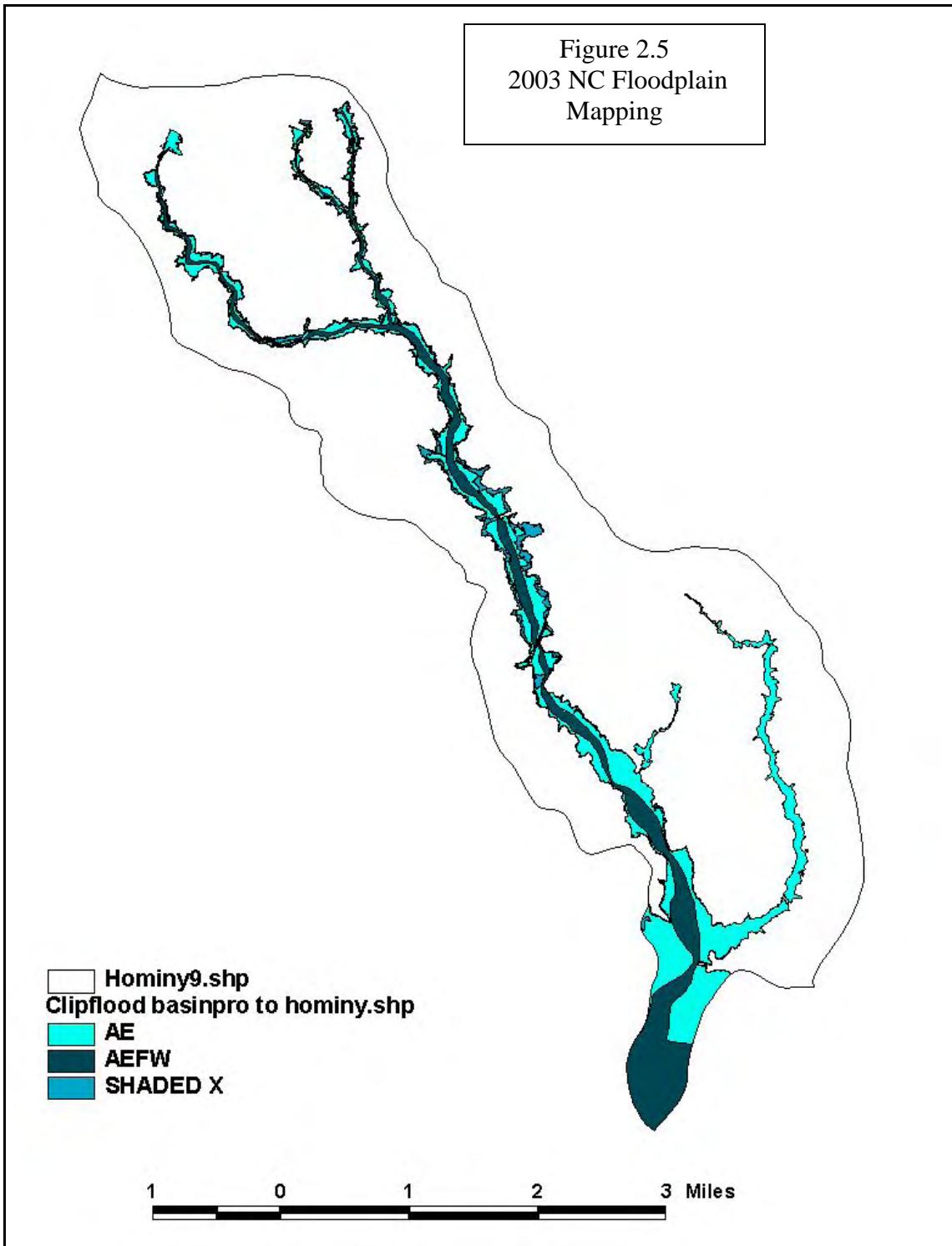


2.4 Floodplains

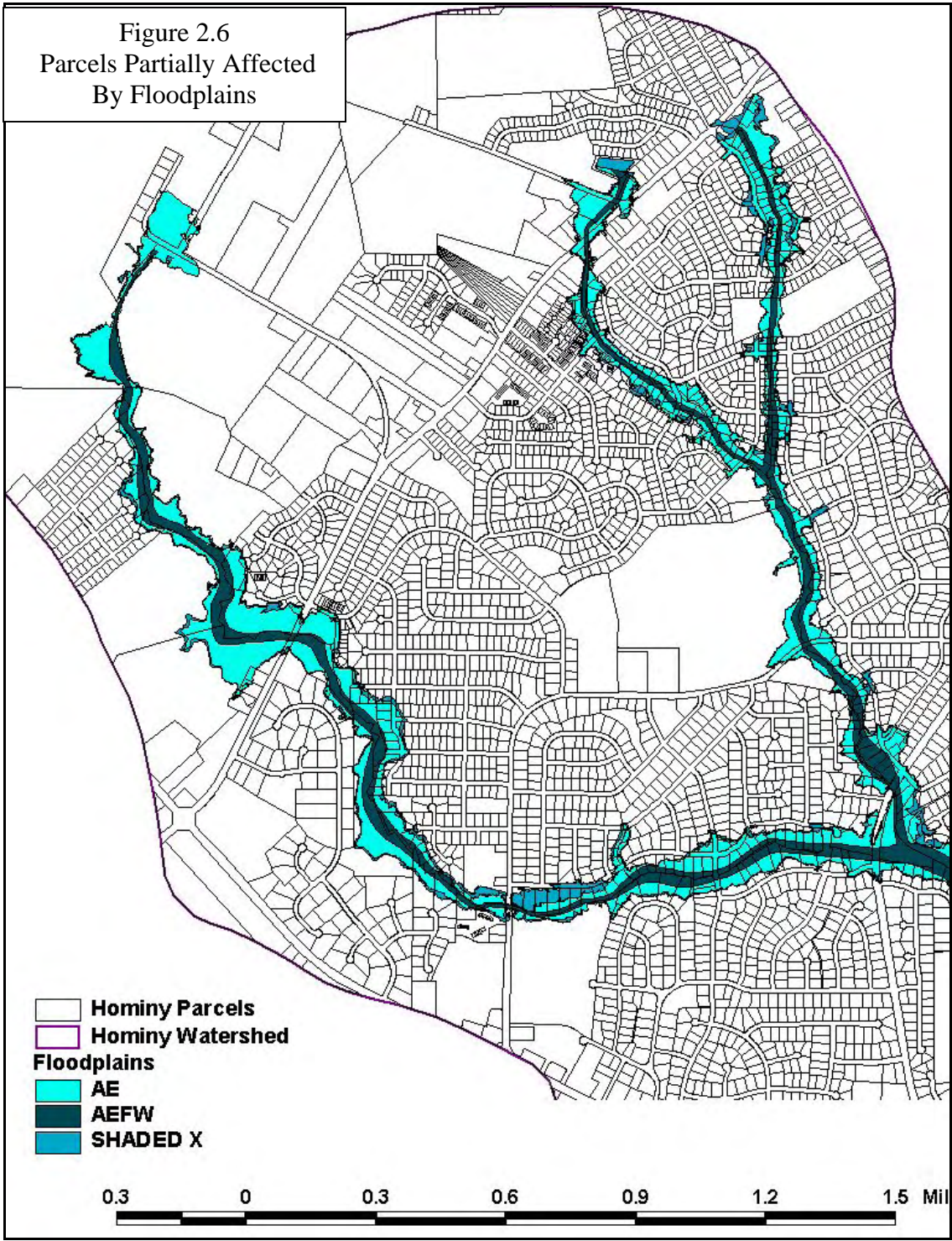
New floodplain maps were adopted by the City of Wilson in 2003 (Figure 2.5). This was part of a statewide re-mapping effort undertaken by the State of North Carolina in an effort to provide more up-to-date information to the Federal Emergency Management Agency (FEMA) and local governments (NC Floodplain Mapping, 2004). FEMA Flood Insurance Rate Maps (FIRMs) are developed for use in floodplain management, determination of flood insurance requirements, and in the regulation of new development and redevelopment in flood-prone areas.

Within the project watershed, the floodplain areas are mapped **Special Flood Hazard Areas (SFHAs)** subject to inundation by the 1% annual chance of flood (i.e., 100-year event): **Zone A** (areas inundated by 1% annual chance flood for which no based flood elevations (BFEs) have been determined), **Zone AE** (areas inundated by 1% annual chance flood for which BFEs have been determined), and **Floodway Areas in Zone AE (AEFW)**; floodway area is the channel of stream plus floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increase in flood heights). **Other Flood Areas** are marked as **Zone X** (areas of 0.2% (i.e., 500-year event) annual chance of flood; 1% annual chance of flood with average depths less than one foot or drainage area less than one square mile). Additional mapped areas include **non-floodplain Other Areas X** (areas outside the 0.2% annual chance of floodplain).

The encroachment of (primarily existing) residential land use into the floodplain is apparent in using the new floodplain maps (Figure 2.6). As a result of this recent mapping effort, portions of a number of previously undesignated properties within the City limits were now designated as floodprone and subject to additional flood insurance protection measures. One of the major challenges in dealing with flooding problems in the City, as in many urban areas, is the fact that property lines are often drawn to the centerline of a stream, and streams change their courses over time. While it is a natural process for unstable streams to find a new path in an attempt to establish stability, in a developed watershed this can exacerbate existing channel and floodplain problems.



New topographic data was developed for the Neuse River Basin as part of the floodplain mapping program (NC Floodplain Mapping, 2004). High resolution LIDAR (Light Detection and Ranging) elevation data are currently available, but were not used in this plan. USGS Topographic maps are provided in Appendix B.



3 Land Use and Historic Trends

Historical Aerial Photos:

In assessing the character of the watershed as seen through aerial photography (from 1938, 1964, and 1998), it is clear that there has been fairly substantial growth throughout the upper and middle portions of the watershed since the earliest aerials were flown. Many structural features are present in the early photos, and infill has occurred over time, indicating that there has been a well-established community for years in Wilson that continues growing today. The road network has become more complex over time, and more development (in residential, commercial, institutional and industrial) has proliferated across the City.

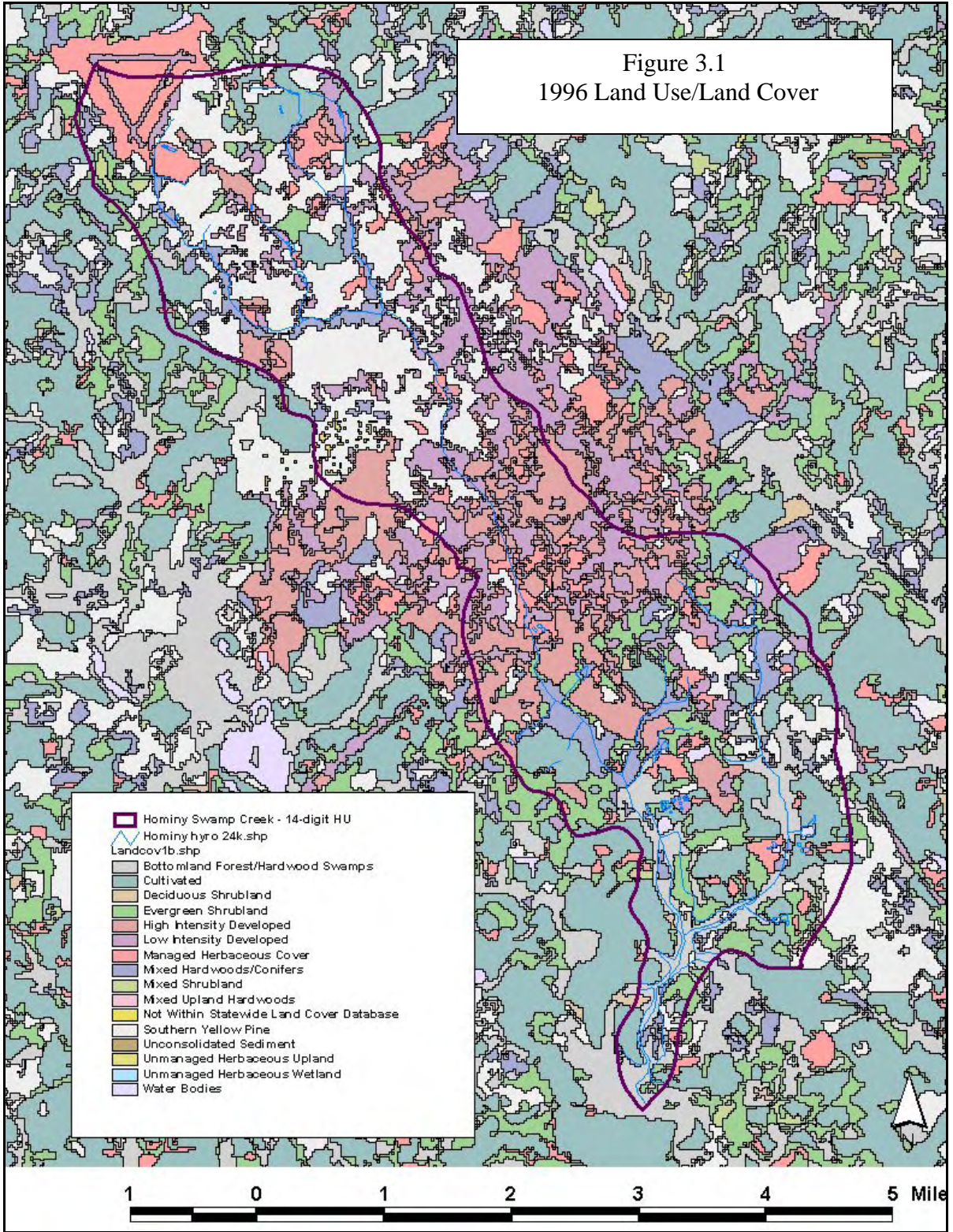
Land Use/Land Cover:

Three land use/land cover data sets were developed at increasingly higher resolution over the past eight years. The first data set is part of the statewide analysis of land use produced in 1996, the only such study of the state's full geographic extent (CGIA, 1996; figure 3.1). The land use/land cover developed in this effort was at 30 m resolution, using 1993-1995 satellite imagery. Table 3.1 represents the breakdown in land use types in the Hominy Swamp Creek watershed developed in the 1996 study.

Table 3.1 1996 Land Use/Land Cover, Hominy Swamp Creek Watershed

Land Cover Class	% Land Area of Watershed
Agriculture	22%
Developed	27%
Forested	49%
Water	4%
Total	100%

There have been concerns that the resolution of this data set does not allow for a high degree of certainty in the quantification of land cover types, compounded by the effects of more recent and rapid land use change, especially in urban areas.



Fortunately, recent studies of land use/land cover in the Hominy Swamp Creek watershed have produced two new analytical procedures developed by the NC State University (NCSU) Center for Earth Observation. The first of the recent methodologies, developed in 1999, produced a 1 meter (target) resolution interpretation using digitized NAPP 1:40,000 aerial photographs (Figure 3.2). This study determined the Hominy Swamp watershed to have the following land cover classes:

Table 3.2 1999 Land Use/Land Cover, Hominy Swamp Creek Watershed

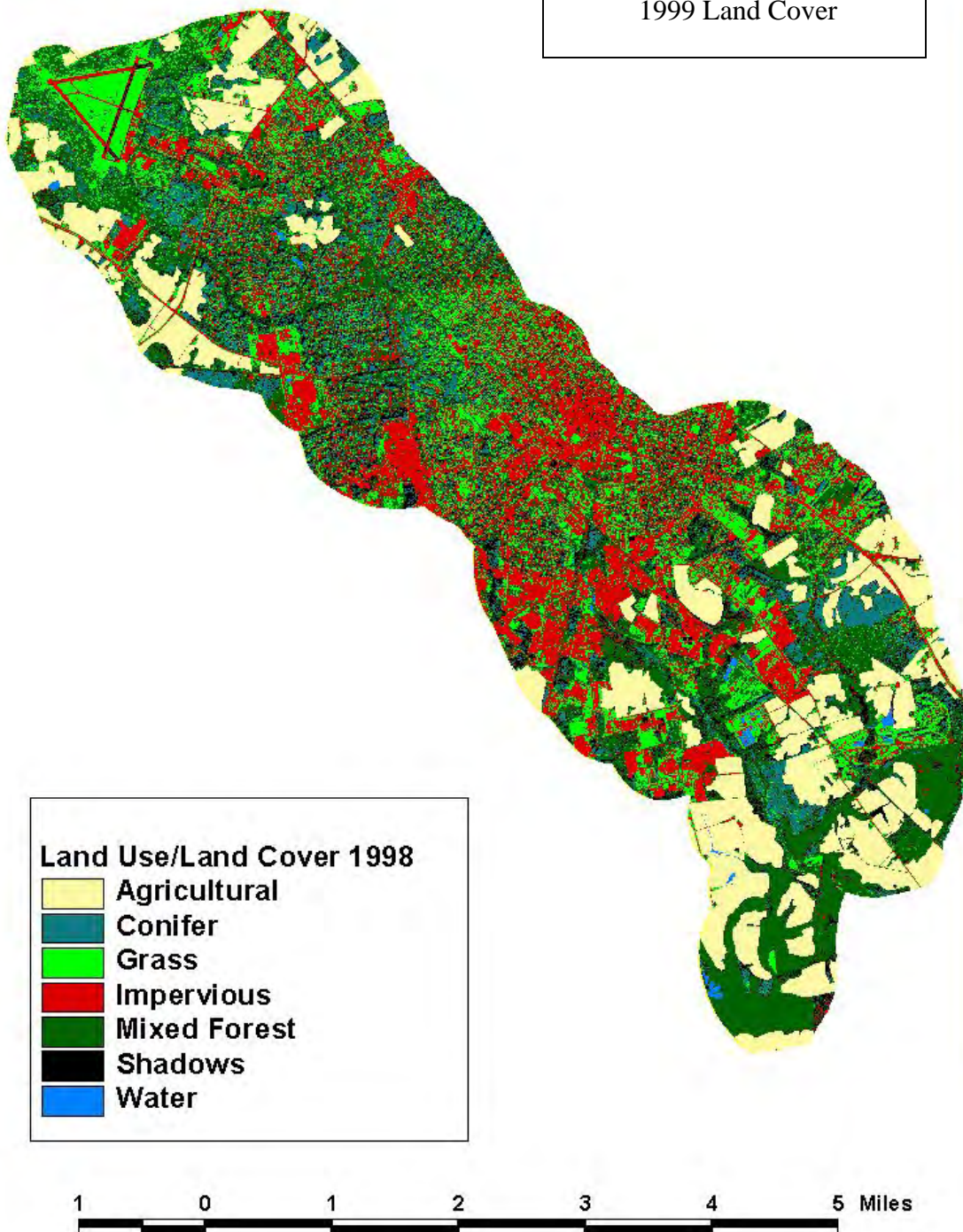
Land Cover Class	% Land Area of Watershed
Urban	22.5
Forest	32.2
Grassland	17.3
Agriculture	17.8
Bare Soil	0.4
Shadow	9.2
Total	99.4

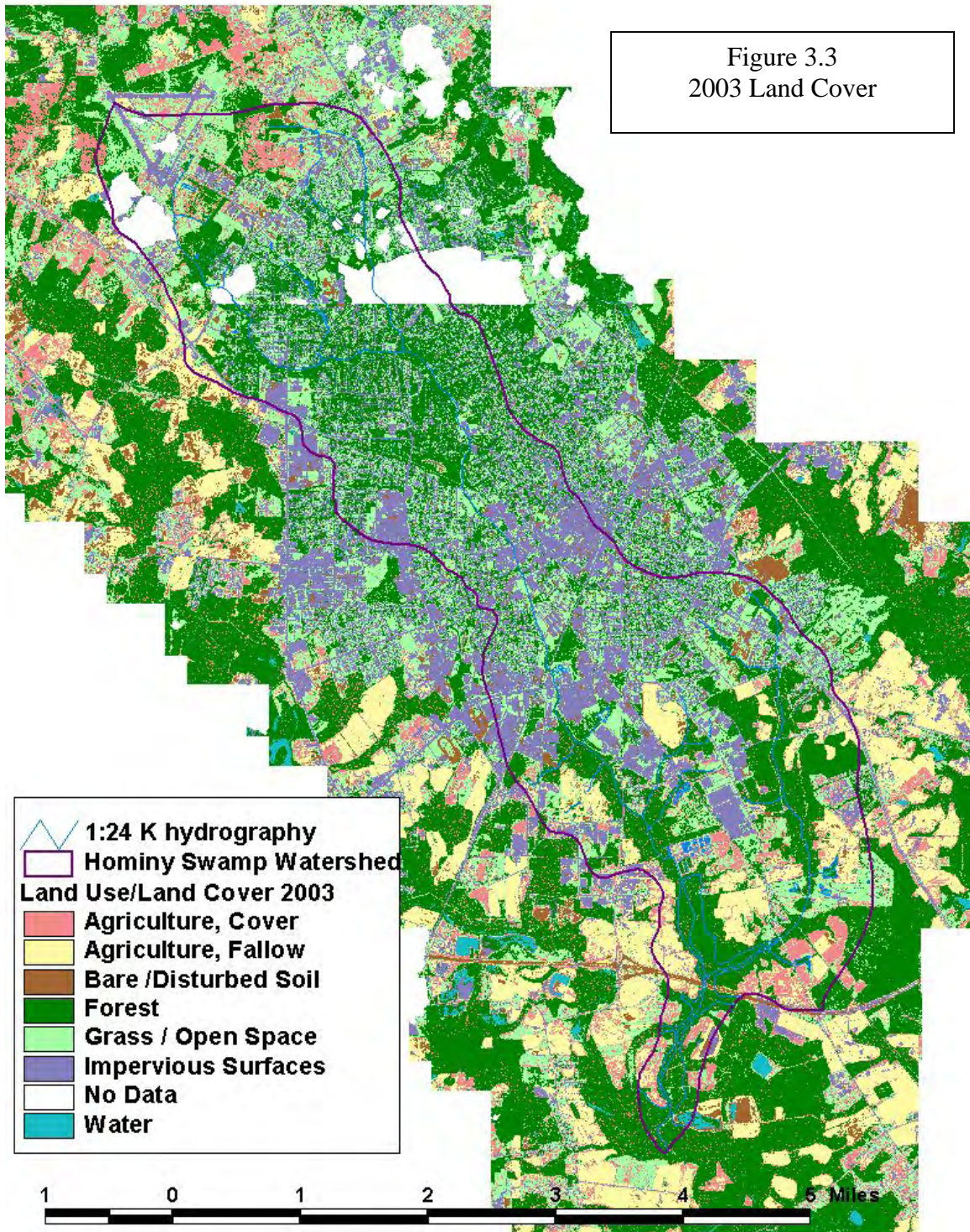
The third process, developed in 2003, looked at the whole watershed as well, but in addition, focused in on the riparian corridor. This classification methodology was developed using a new technique to fuse 4 meter multi-spectral and 1 meter panchromatic satellite imagery, with a target resolution of 4 m (figure 3.3). This study determined the Hominy Swamp watershed to have the following land cover classes:

Table3.3 2003 Land Use/Land Cover, Hominy Swamp Creek Watershed

Land Cover Class	% Cover, Entire Watershed	% Cover, 50' Stream Buffer	% Cover, 100' Stream Buffer	% Cover, 300' Stream Buffer
Water	0.6	1.5	1.1	0.7
Impervious Surfaces	21.4	5.0	6.8	11.5
Agriculture, Fallow	7.9	0.8	1.1	2.0
Agriculture, Cover	6.8	4.0	4.1	4.7
Grass/Open Space	24.1	15.8	16.7	20.4
Forest	32.5	72.4	69.4	59.0
Bare/Disturbed Soil	3.3	0.4	0.7	1.8
Clouds/Shadow	3.5	?	?	?

Figure 3.2
1999 Land Cover





Several conclusions may be drawn from these data. Impervious surface, as seen through application of both later methodologies, exceeds 21% for the watershed as a whole. Many current studies regarding stream water quality and habitat in urban areas indicate that downward trends (increase in erosive forces and sedimentation, decline in benthic habitat, etc.) begin at 10-11% impervious cover (Center for Watershed Protection, 2000). By all accounts these trends are evident in the Hominy Swamp Creek watershed, as seen during site visits to “hot spots” recommended for further investigation by natural resource professionals in Wilson, serving in an advisory capacity during the development of this assessment.

Other conclusions include greater than 25% of the 50’ riparian buffer and 30% of the 100’ are no longer maintained in a forested condition. It is widely recognized that a 50’ forested riparian buffer (and preferably wider) serves many beneficial functions, including assimilating certain nonpoint source pollutants carried in overland flow, slowing such flows and allowing for infiltration, and benefits of riparian corridor habitat.

4 Existing Water Quality:

Hominy Swamp Creek is classified by the NC Division of Water Quality (DWQ) as Class C Nutrient Sensitive Waters (NSW) Swamp Waters (SW). Most of the waters in the larger subbasin of Contentnea Creek (Neuse 07, 700 sq. mi.) are similarly classified, barring those designated as public water supply watersheds. The mainstem of Hominy Swamp Creek becomes perennial at the confluence of two intermittent tributaries north of Forest Hills Road; most others waters within the watershed are intermittent according to USGS maps. At base flow, Hominy Swamp Creek is a slow moving swamp waters system, impacted by channelization over time that has caused it to function in many segments primarily as drainage and stormwater conveyance. Precipitation averages 48” a year in the area, and common rainfall events can cause high peak, erosive storm flow.

Point-Source Dischargers:

There are two minor National Pollution Discharge Elimination System (NPDES) point source dischargers in the Hominy Swamp watershed, operated by local businesses. The one major NPDES within City limits, the Wilson wastewater treatment plant, discharges to Contentnea Creek. The City of Wilson received a grant of \$803,000 from the NC Clean Water Management Trust Fund to help upgrade this facility.

Review of Existing Monitoring Data

Very little routine and methodical water quality or geomorphic monitoring has occurred in the Hominy Swamp Creek watershed to date. No ambient water quality monitoring has been pursued by the state; however, the Division of Water Quality performed a special study as part of the basinwide biological assessment in 2001, involving the collection and analysis of 2 benthic samples (Fig. 4.1). These samples indicated “poor” benthic classifications (DWQ, 2001), which led then to an “impaired” use support status in 2002

(DWQ, 2002). Subsequently, the mainstem of Hominy Swamp Creek is listed on the 2004 Draft 303(d) List of impaired waters (DWQ, 2004).

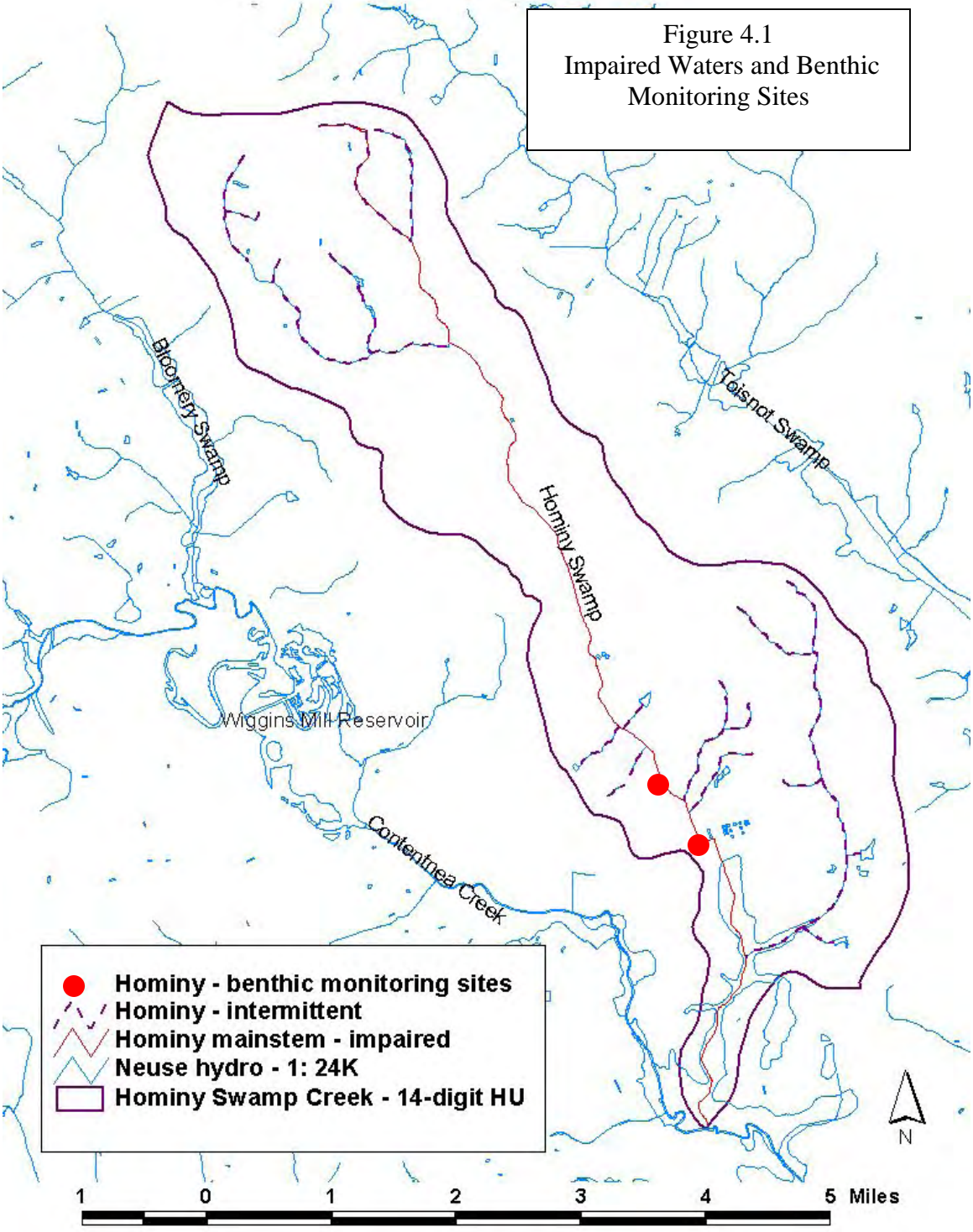
There was no funding allocated during this study for additional water quality sampling. While there has been frequent newspaper documentation of flood events (Hurricane Floyd caused extensive flooding in Wilson, but smaller rainfall events cause neighborhood flooding and road closures, and subsequent damage to infrastructure and personal property), there has been little in the way of stormflow sampling or flow measurement. A new USGS gaging station has been installed in the watershed, but data has only been available for one month.

During the course of this planning effort, the City has allocated resources to purchase sampling equipment and dedicate staff resources for collection of water quality samples. A systematic monitoring program addressing water quality, hydrologic influence, and instream habitat would pave the way for watershed improvements, by documenting the need for and the benefits that could be realized through restoration efforts. Through discussion with local programs during this planning effort, it has been discerned that citizen involvement in the collection of water quality data would benefit stewardship efforts in the watershed.

Nutrient management is an issue throughout the Neuse River Basin. Nitrogen control is of particular interest, and is the primary focus of the Neuse River Basin Nutrient Sensitive Waters Strategy, adopted in 1997 (see [referenceciting DWQ website link](#) for further information on the strategy and rules). This strategy is a means to equitably distribute requirements for nitrogen reduction among several key sources, including wastewater dischargers, urban stormwater, and agriculture, with concomitant requirements for protection of riparian buffers and development of nutrient management plans for businesses performing routine land application of fertilizers. The “Neuse Rules” were developed and many state and local programs were created or enhanced to address components of the strategy.

In reviewing programs and tools developed to implement the strategy, the far-reaching nature of this effort becomes apparent. If one were to look solely at agricultural and stormwater influences in the Hominy Swamp Creek watershed, indications are that nitrogen loading is definitely a concern, as urban and agricultural land uses contribute the highest nitrogen loading rates of commonly categorized land use classes.

Figure 4.1
Impaired Waters and Benthic
Monitoring Sites



5 Local Ordinances, Rules, and Programs

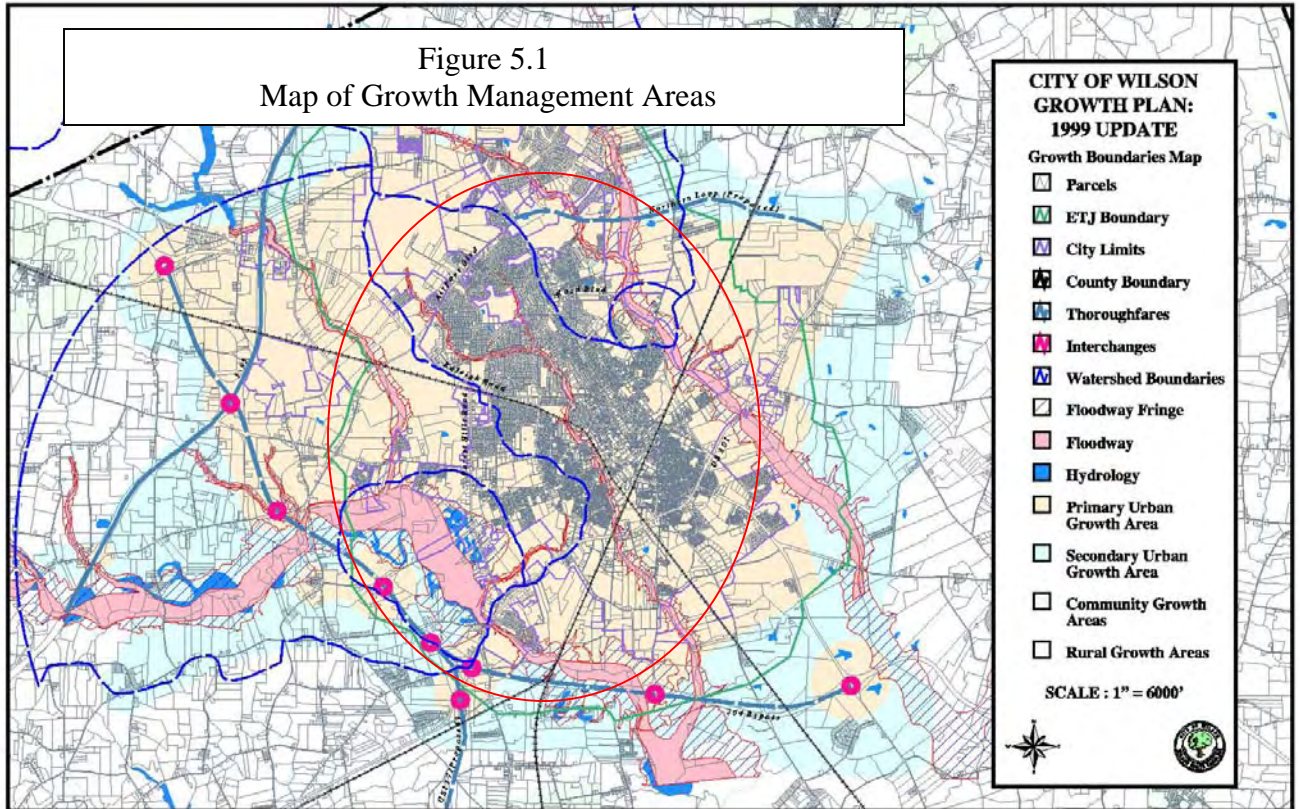
As part of the Neuse River Basin Nutrient Sensitive Waters strategy, the City of Wilson enacted a state-approved Stormwater Plan in 2002. The strategy requires achieving 30% reduction in nitrogen export, maintaining pre-development runoff flows, and maintaining existing riparian buffers. Through this plan, the City is responsible for new development plan review and approval, illegal discharge identification, removal, and prevention, retrofit location identification, and public education on stormwater issues. The City is also responsible for maintenance of the stormwater drainage system.

In 2003 the City established a Stormwater Utility, which provides funding for operation of the City Services Stormwater Program. This program has developed an admirable array of local efforts, ranging from stormdrain labeling to public advertisements regarding stormwater issues, and participates in NCSU's Stormwater Academy and BMP Tour.

The City participates in the State's Erosion and Sedimentation Control Program, requiring plans to be filed with the State for land disturbances greater than 1 acre. The City also has zoning and planning programs (zoning maps included in Appendix D), as well as a Growth Management Plan updated in 1999. Lands containing highly functioning wetlands areas in the headwaters of the stream system are currently zoned to allow agriculture, office and retail, and residential development. The majority of the Hominy Swamp Creek watershed (all except the lowest portion, outside City limits) is within the primary urban growth area established by the local Growth Management Plan (Figure 5.1).

The City of Wilson Hazard Mitigation Plan, developed in 2003, describes critical floodplain and flooding issues. At present, local ordinances do not allow new development within the floodway, the most critical part of the floodplain; however, the ordinance does not fully restrict development within the 100-year floodplain and floodway fringe. New residences may be constructed with the first floor elevation 2.5' above base flood. This was shown to be inadequate protection, when in 1999 Hurricane Floyd, a 500-year flood event in Hominy Swamp Creek, swept through with major property damage due to flooding. More restrictive floodplain development requirements were recently proposed, and partially approved for the City.

Figure 5.1
Map of Growth Management Areas



6 Site Assessments

Establishing an advisory group to help identify watershed planning goals and objectives and to help with site identification was a major part of plan development (as summarized in Appendix A). Local agency staff identified concerns including alleviating problems associated with high peak flow, flooding, and resulting sedimentation in the stream channel. There is abundant anecdotal evidence of excessive sedimentation, experienced particularly through the Stormwater Program responsible for culvert maintenance. Flooding, stormwater retention, and nutrient management are widely acknowledged as major problems for local programs and citizens alike. Because the upper half of the watershed is largely developed, it is a challenge to locate available sites for stormwater Best Management Practices (BMPs) to provide adequate storage for floodwaters or provide water quality improvements.

Efforts were made throughout the site assessment process to identify areas that exhibit impacts to hydrologic, water quality and/or habitat functions, as well as present need and opportunity for improvement of these functions. Each of the sites identified represented some facets of impacts to functions as well as potential for improvement measures. As a rough overview, the watershed is broken down into 3 areas: upper, middle and lower Hominy Swamp. The upper and middle portions are entirely within the city's municipal boundaries, and in the lower portion, lower stream reaches are outside of the city limits but within Wilson County. For the purposes of this assessment and restoration plan, these three distinct areas will be referenced:

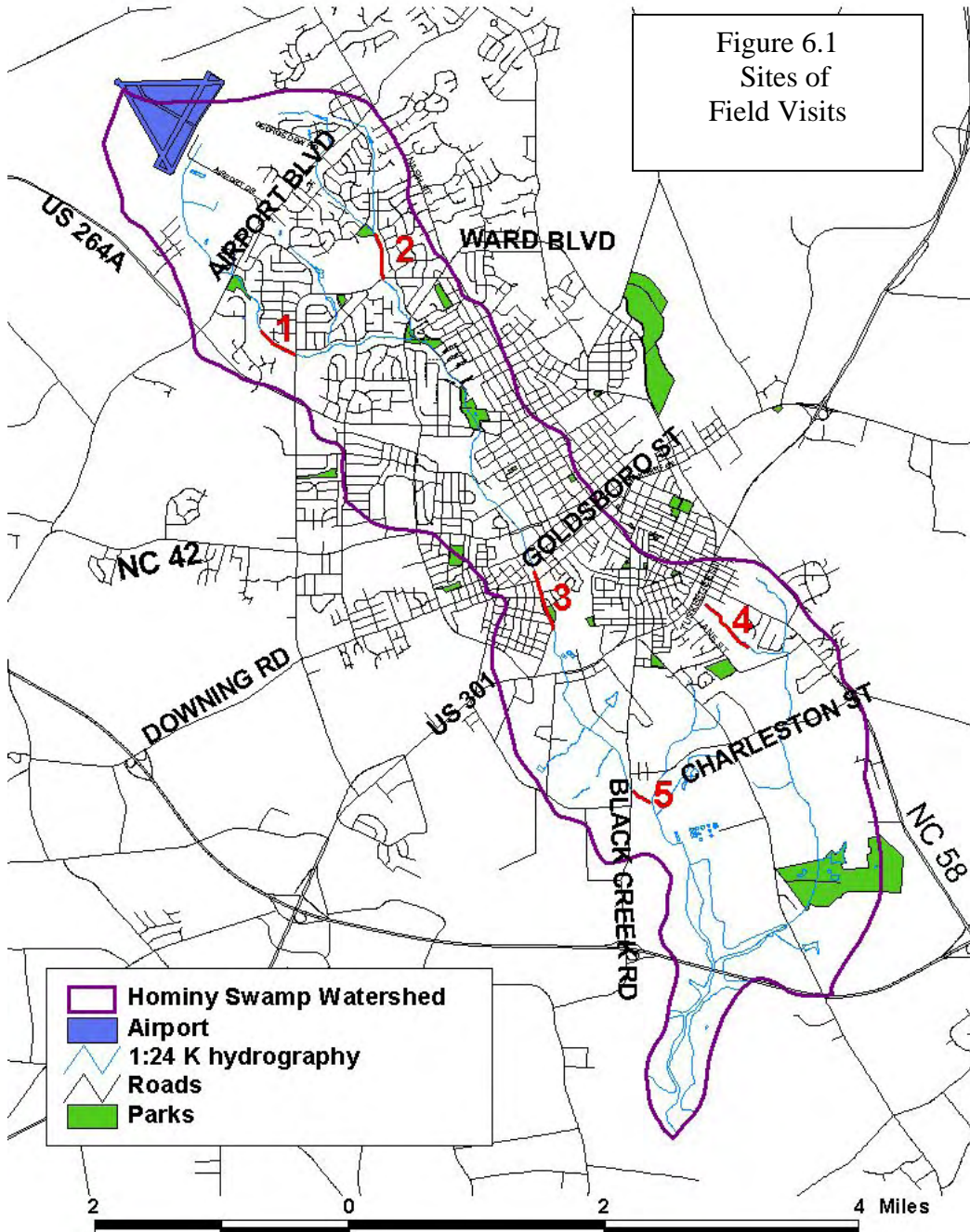
Upper Hominy is dominated by medium to high density, primarily older residential (mid-1950's to mid-1980's), with newer high density residential proliferating in the higher reaches (headwaters areas). The regional airport and a closed landfill facility are located in the very headwaters of the watershed, with land in the area zoned residential, business, agricultural, and institutional.

Middle Hominy Swamp Creek is primarily medium to high-density residential, industrial, and urban core. The stream system throughout this reach of the watershed is maintained primarily as a canal to transport water off-site. Straightening of the channel occurred in the early 1930's, and routine dredging of the channel has occurred over time. There are residential, commercial, institutional, industrial land uses within this portion of the watershed.

Lower Hominy transitions from a well-established commercial strip with mixed low density residential and scattered industrial land uses to primarily agricultural land use at the lower reaches of the watershed.

Several site visits were initiated during the summer and fall of 2003 (Figure 6.1). While no formal riparian area assessment methodology was employed during site visits (such a methodology is under development as part of this grant), efforts were made to

identify areas that represent characteristics present throughout the watershed (severe channel erosion, excessive sediment deposition, impacted riparian buffer), as well as exhibiting potential for stream and riparian buffer restoration and stormwater management (summary sheets are provided in Appendix E). Field assessments indicate that there are obvious problems that need addressing throughout the watershed, as anticipated through the GIS analysis.



Figures 6.2 a, b: Site #1: Upper Watershed: vegetated riparian area with major erosion and headcut



Figures 6.3 a, b, c: Site #2: Upper watershed: major erosion on both banks of channel, downcutting; evidence of very high flows depositing heavy sediment load; impending property damage.



Figure 6.4 a,b: Site #3: Mid-watershed, mainstem: channel straightened and dredged; minimal riparian vegetation and instream habitat; evidence of heavy sediment load

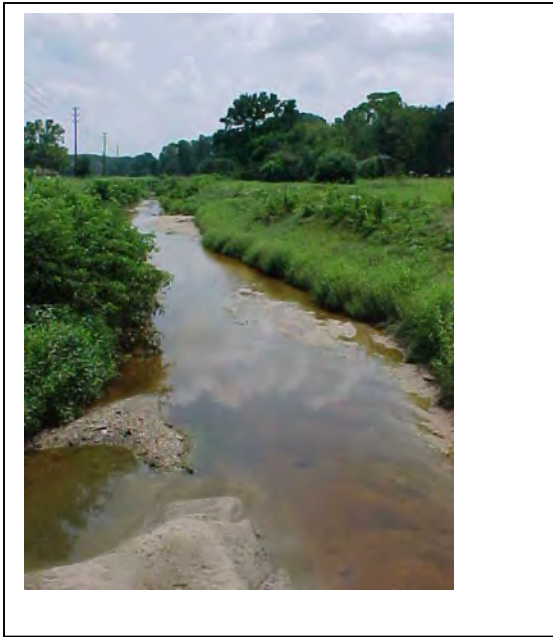


Figure 6.5: Site #4: Lower Tributary; lack of riparian buffer; major erosion of channel downstream



Figure 6.6: Site #5: Invasive vegetation; channel erosion



7 Potential Restoration Opportunities

Several potential restoration opportunities were identified through the process of developing the watershed assessment and through the involvement of local natural resource professionals. In this context, restoration is not intended as a strict regulatory definition, but more generally to include stream channel enhancement and stabilization measures, as well as riparian buffer restoration and enhancement.

It was agreed that three major functions (hydrologic, water quality, and habitat) have been compromised through watershed changes and wetlands loss and degradation over time, and that restoration, enhancement, and protection efforts should be matched as closely as practicable to replace and preserve those functions, within the context of the current watershed status.

Figures 7.2-7.15 represent a range of opportunities for improvement of watershed functions. There is no assumption that these opportunities may be feasible for project implementation, but were identified as priority areas within this planning effort.

Potential Project Types:

Preservation of Watershed/Riparian Function:

Protection of those areas identified as exceptionally significant for hydrologic processes, water quality and habitat functions was identified as a key objective in the planning process. Several areas of interest have been identified, particularly in the headwaters area (Figure 7.9), as well as in the lower reaches of the watershed (Figure 7.8). If resources allow for preservation of these areas, landowner identification and contact should be pursued. Efforts should be made to promote protective strategies on high priority preservation parcels.

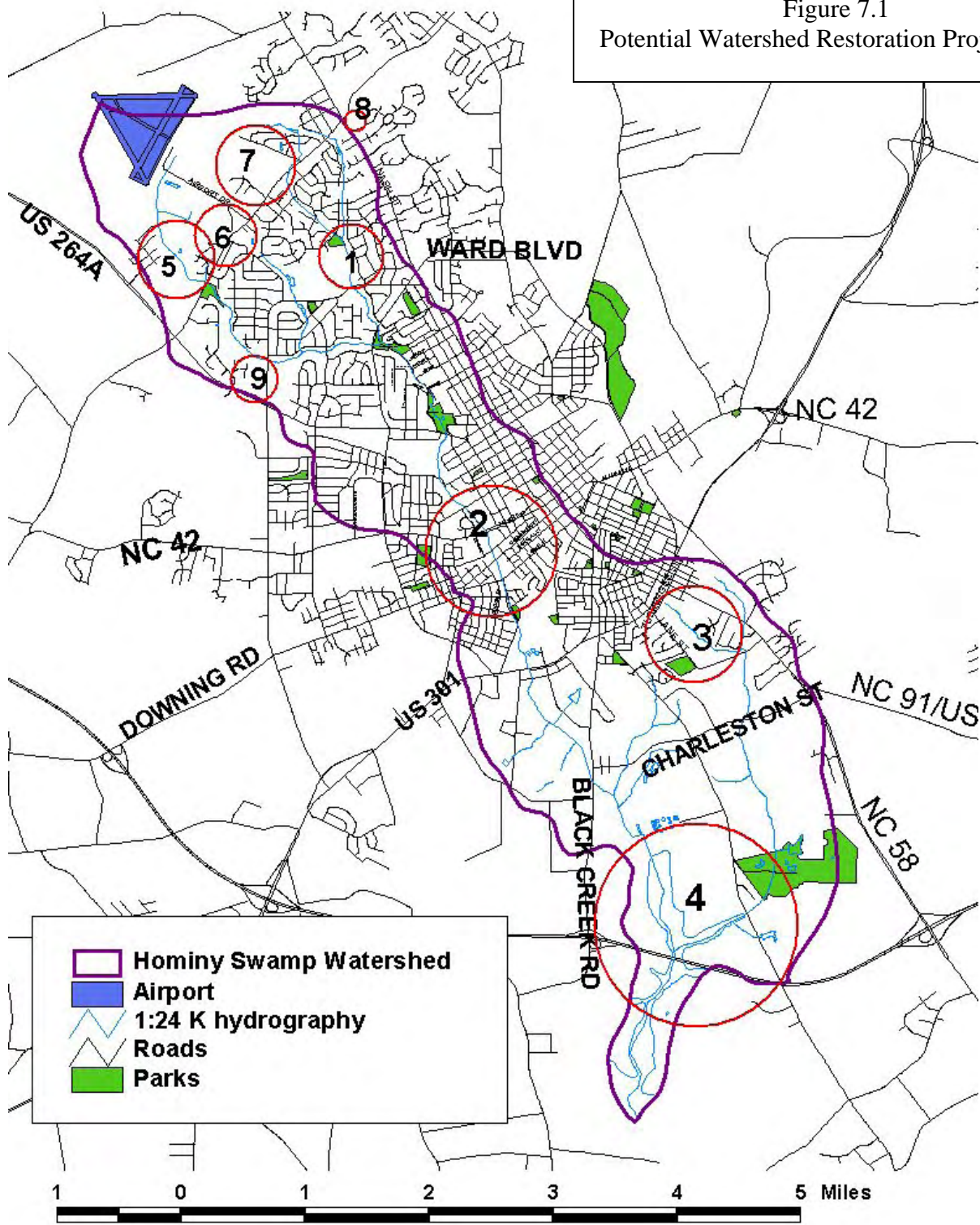
Restoration and Enhancement of Riparian Corridor:

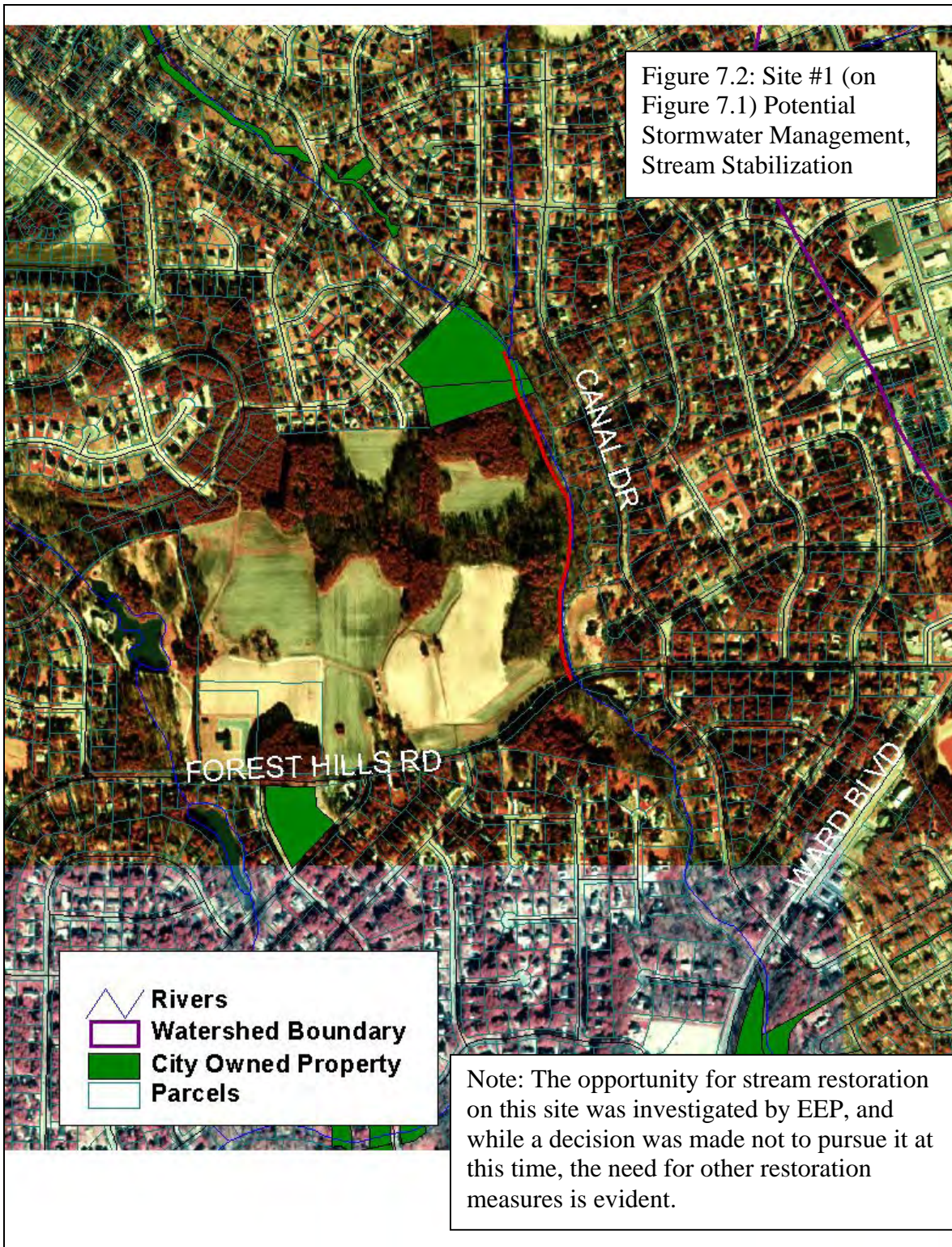
Many reaches within the study area are candidates for some level of stream enhancement or restoration. Riparian buffer restoration in the central portion of the watershed is promising, where land has been purchased by the City through the FEMA buy-out program (Figure 7.3). These areas may provide good opportunities for restoration practices, since they are public properties within the floodplain, and contain no existing structures. Management of exotic species should be integrated into corridor improvement projects as necessary. While funding is available through EEP for buffer restoration projects, no specific EEP funds for use in channel restoration have been identified at this time.

Existing and Potential BMP Implementation:

Multiple opportunities for BMP implementation, both agricultural and stormwater, were identified during site visits with local resource professionals. NRCS and SWCD have been actively cataloging benefits of agricultural BMPs throughout the county. Within City limits, retrofit opportunities on publicly-owned or unbuildable lots are of primary interest. Focusing on small-scale retrofits in the headwaters and mid-watershed would provide needed water quality improvement (particularly nutrient removal) while utilizing existing EEP in-lieu fee financial resources earmarked for riparian buffer restoration and nitrogen control. Stormwater wetlands are one type of BMP that may receive high priority for use of EEP in-lieu fee resources (i.e., nutrient offset payments received by EEP).

Figure 7.1
Potential Watershed Restoration Project Sites





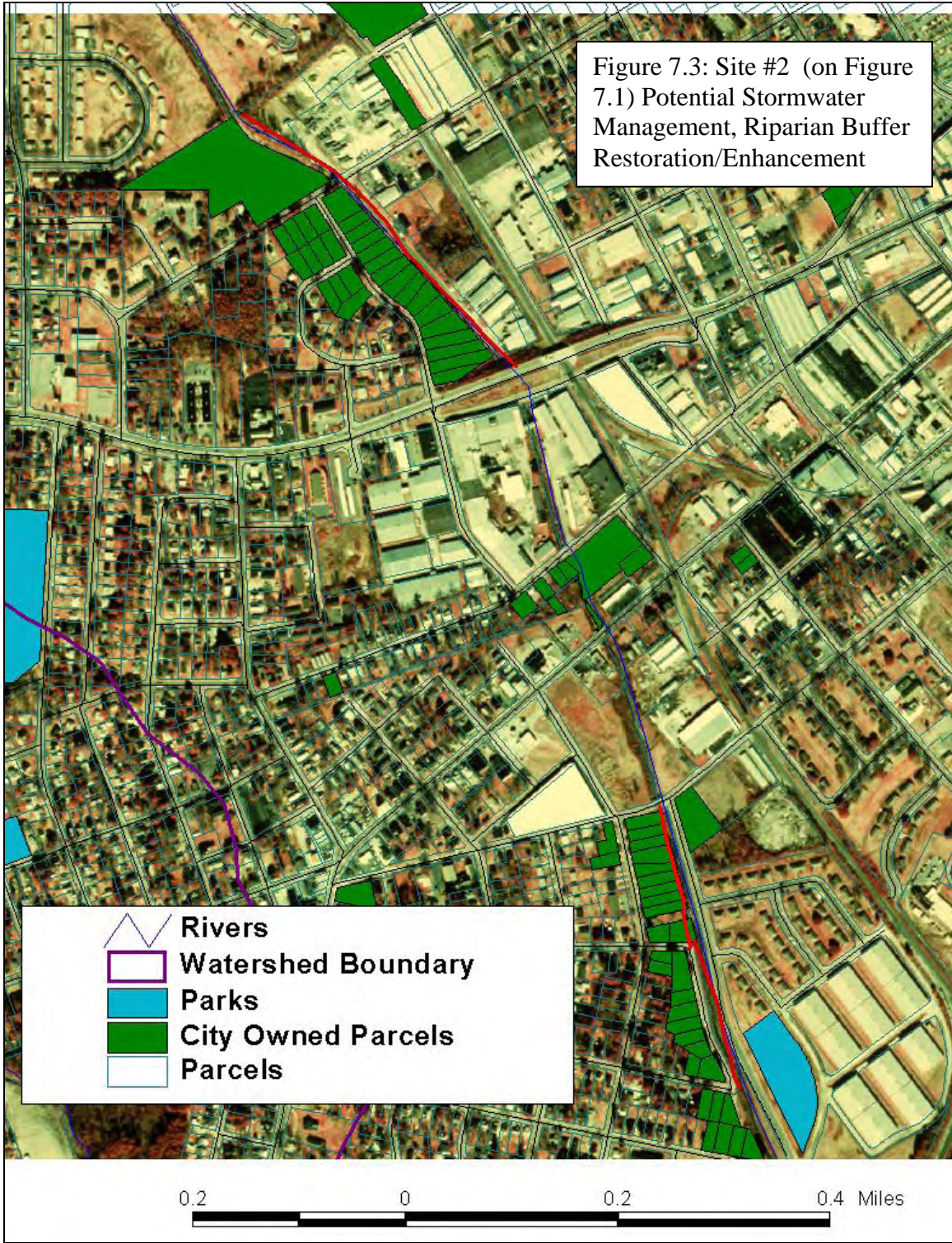
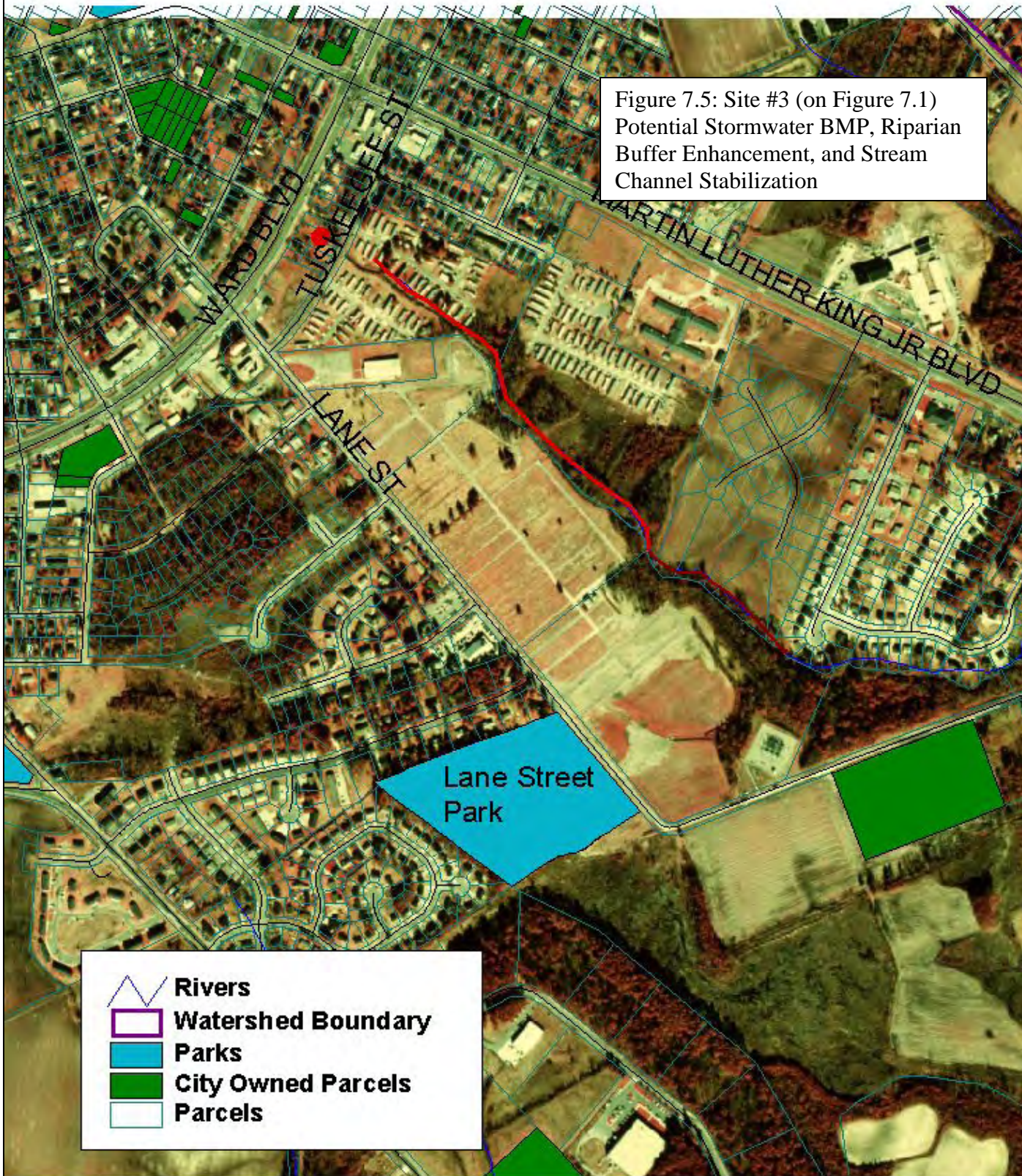


Figure 7.4: Site #2 (on Figure 7.1) Buy-Out Area, Meadow Street



Figure 7.5: Site #3 (on Figure 7.1)
Potential Stormwater BMP, Riparian
Buffer Enhancement, and Stream
Channel Stabilization



-  Rivers
-  Watershed Boundary
-  Parks
-  City Owned Parcels
-  Parcels

0.3

0

0.3

0.6

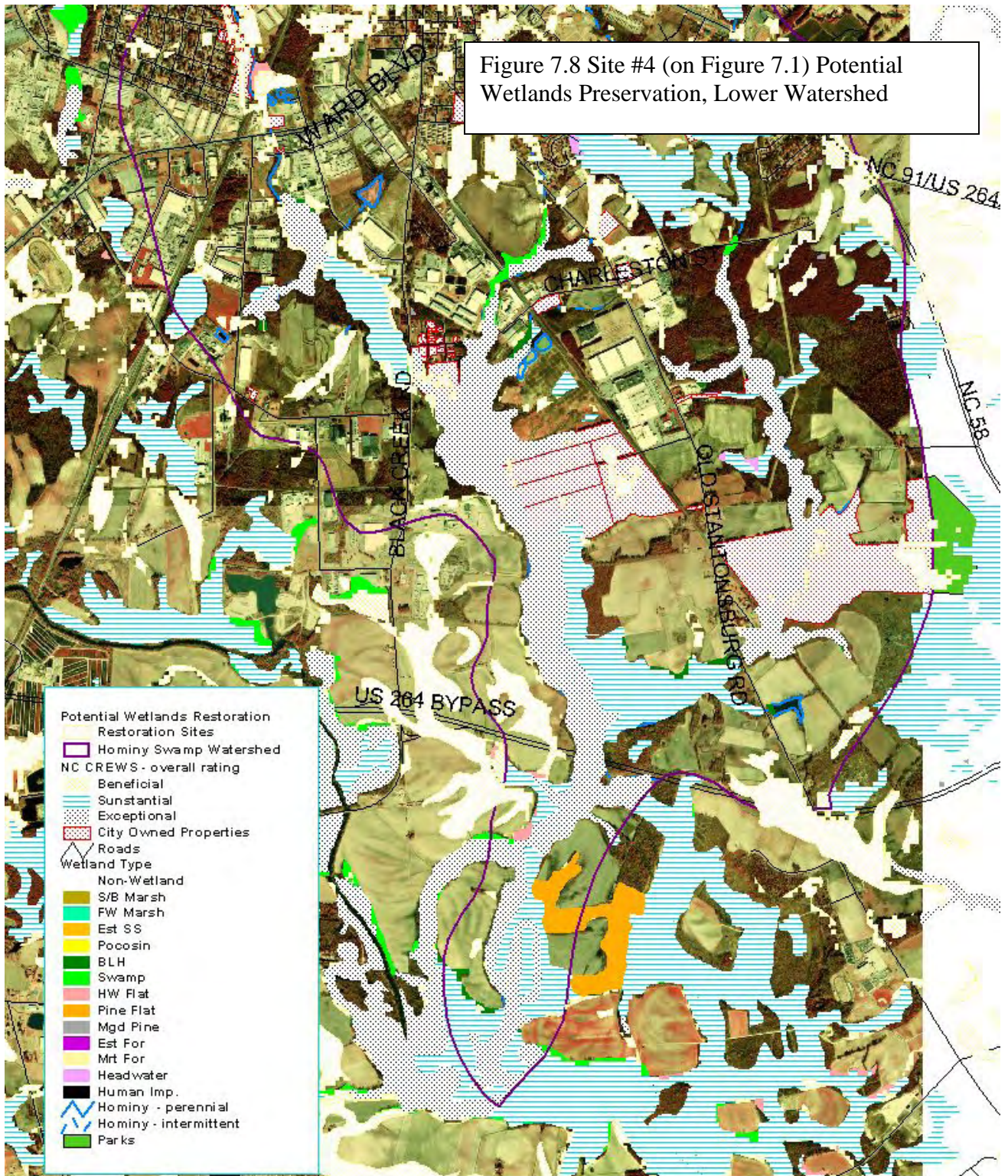
Figure 7.6: Site #3 (on Figure 7.1) Site for Potential Stormwater BMP



Figure 7.7: Site #3 (on Figure 7.1) Potential Riparian Buffer Enhancement



Figure 7.8 Site #4 (on Figure 7.1) Potential Wetlands Preservation, Lower Watershed



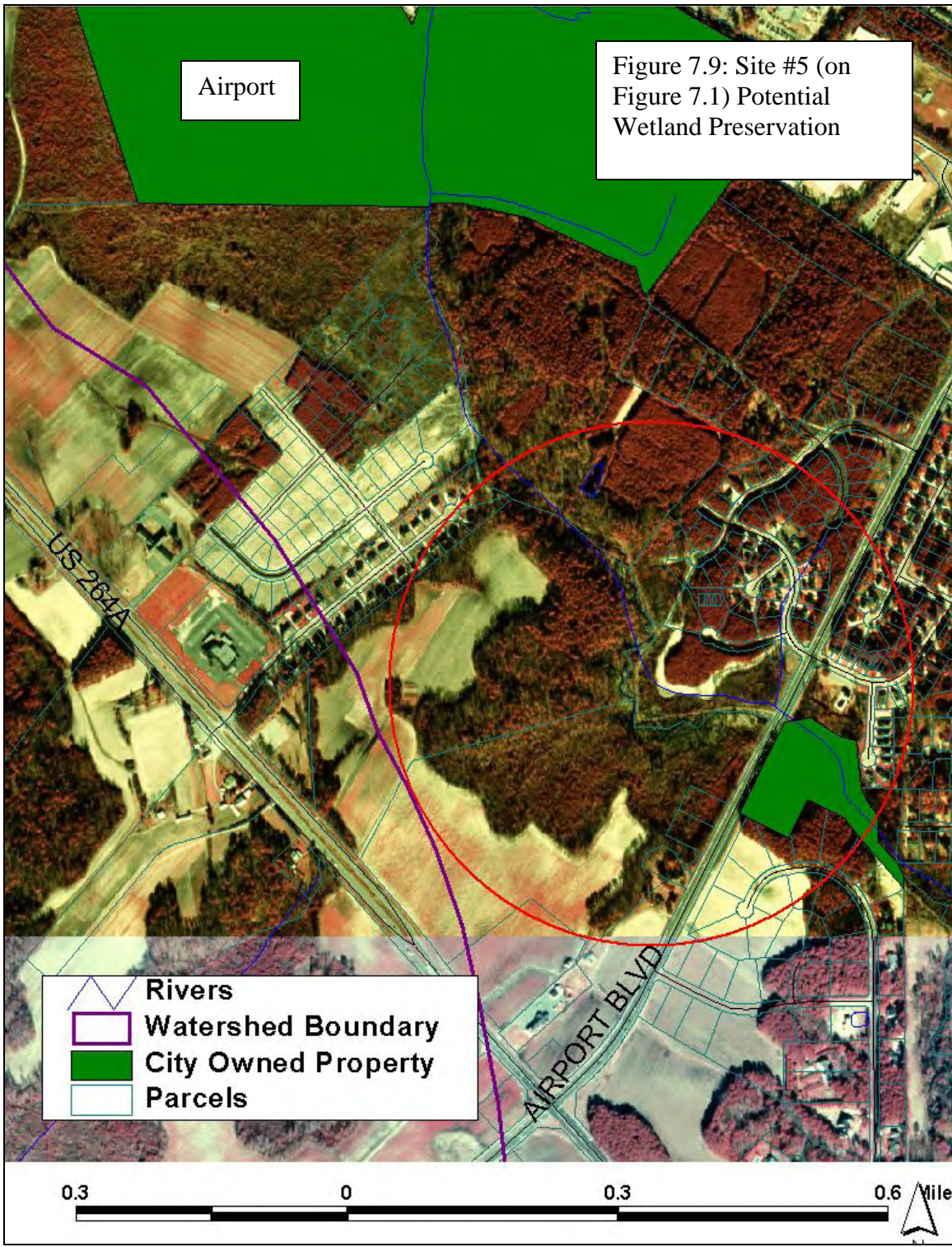
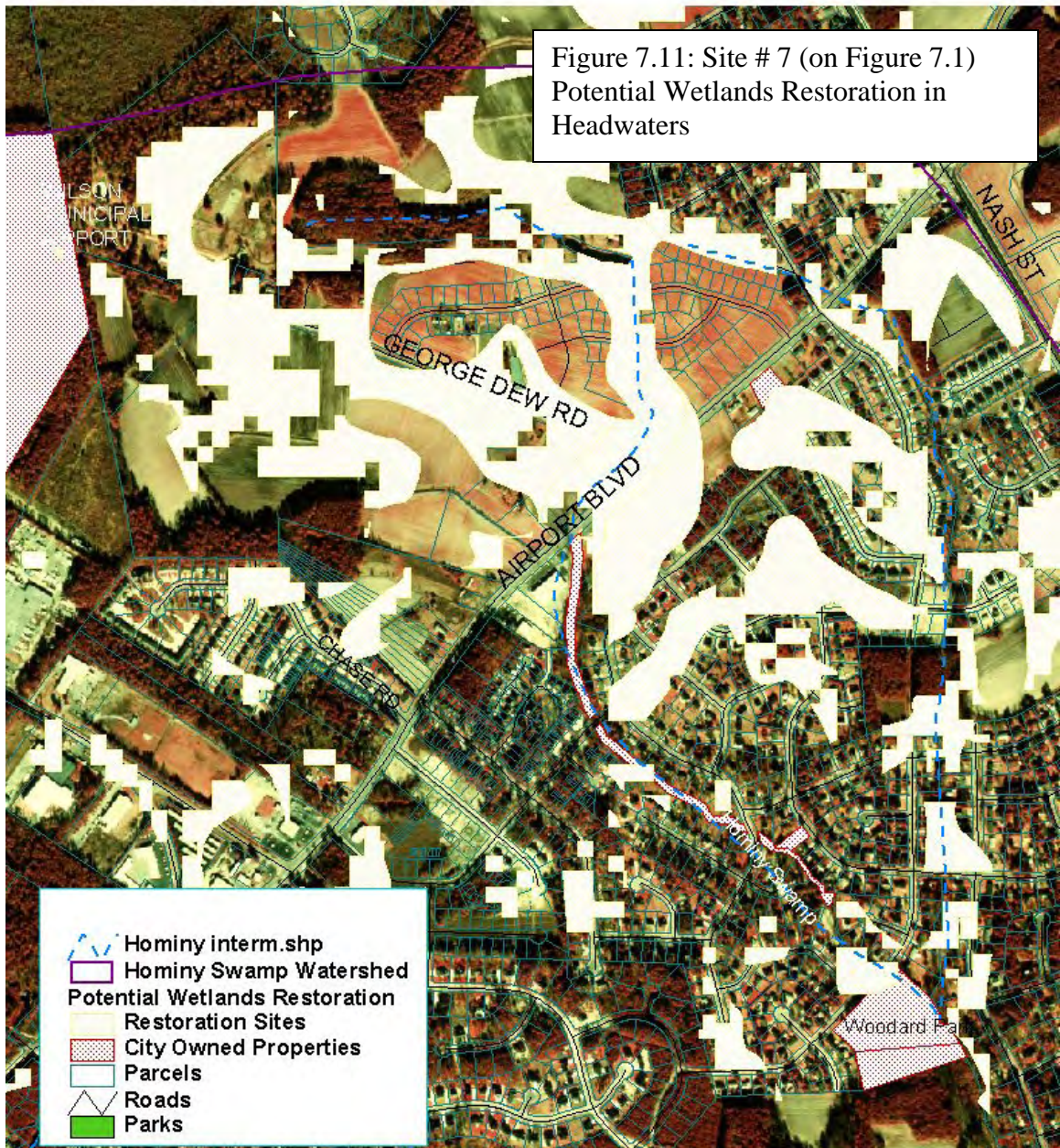


Figure 7.10: Site #6 (on Figure 7.1) Potential Site for Stormwater BMP, near Airport Road





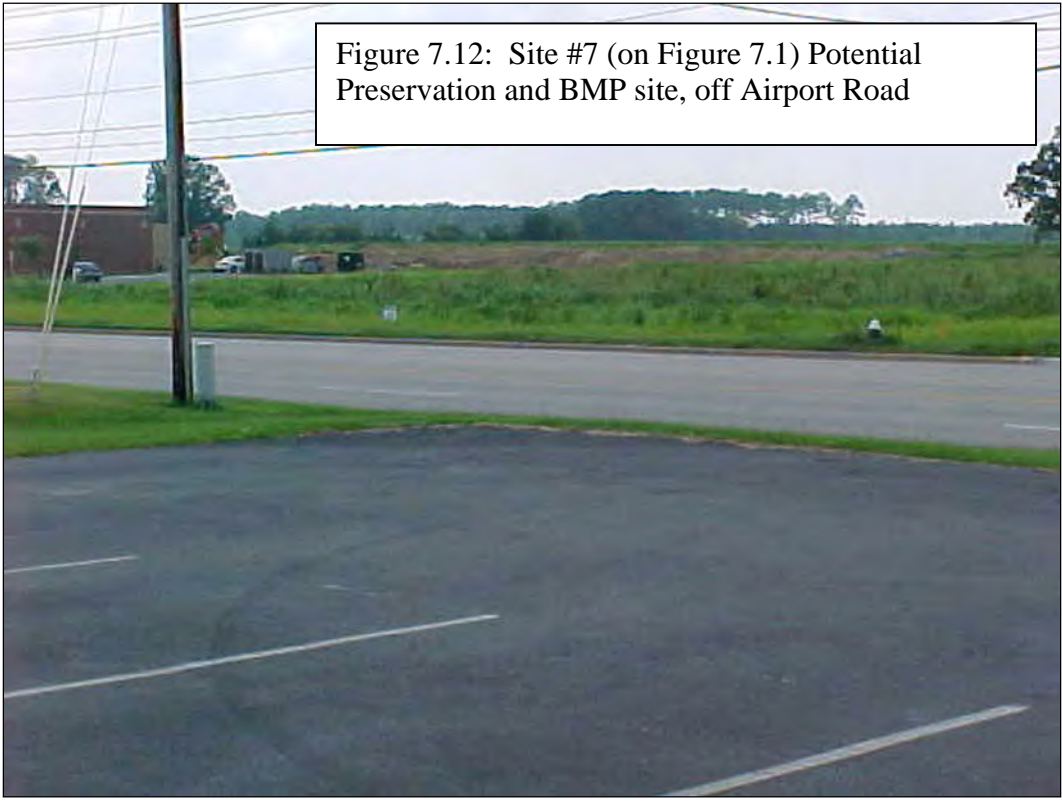


Figure 7.12: Site #7 (on Figure 7.1) Potential Preservation and BMP site, off Airport Road



Figure 7.13: Site #7 (on Figure 7.1) Potential Preservation and BMP site, off Airport Road



Figure 7.14: Site :#8 (on Figure 7.1)
Example of Bioretention Installed ,
Toisnot Creek Watershed, near Airport
Road



Figure 7.15: Site # 9 (on Figure 7.1)
Potential Site for BMPs, off Raleigh Road

8 Implementation Strategy

- 1) Several sites have been identified herein for further investigation as potential stormwater wetlands and other BMPs. Additional site assessment work will allow for the evaluation of sites for project implementation. All projects should incorporate preconstruction and post-construction monitoring to demonstrate improvements to water quality and benthic habitat. Funding is presently available through EEP for project design, construction, and monitoring for BMPs that meet the 30% nitrogen reductions required by the Neuse River Basin Nutrient Sensitive Waters Management Strategy.
- 2) Work with EEP to establish riparian buffer restoration and BMP implementation on city-owned properties vacated through the FEMA buy-out program. Funding is currently available for applicable projects through EEP's in-lieu fee program. Continued pursuit of funding by the City for the purchase of flood-prone structures and properties is a considerable effort, but long-term benefits would be significant.
- 3) Continue and expand public education for citizens and local officials regarding watershed management practices including stormwater management and more protective development strategies (low impact design, conservation and restoration of existing natural features, especially in headwaters). Hands-on workshops sponsored through resource programs (NRCS, Cooperative Extension) are recommended to encourage citizen stewardship.
- 4) Evaluate recommendations from funding analysis (Appendix B). Additional funding opportunities may be appropriate, though past applications have not been successful (particularly for Section 319 funding). Recent 303(d) listing may now provide added incentive for grant funding. This plan may serve as the basis for additional, more detailed assessments of subwatersheds, particularly if Section 319 funding is desired, considering the recent emphasis for proposed projects to demonstrate improvements in nonpoint source abatement through monitoring within the context of watershed planning.

Recommended Actions

Project Implementation and Monitoring: Both project site-specific and watershed-wide monitoring for water quality and habitat parameters will help document current impacts and provide support for improvement efforts. Pre- and post-construction and reference site water quality, benthic macro-invertebrate, and geomorphic monitoring should be integrated into any physical restoration activities.

Preservation: Protect high quality wetland and stream features to support beneficial watershed functions and recreational benefits. Highly functioning wetland areas have been identified in both the upper and lower watershed; protection of these areas will aid in maintaining current hydrologic, water quality, and habitat functions.

Outreach: Continued community outreach and education regarding stormwater and watershed management practices will help foster understanding of natural and human-influenced processes at work in this challenging watershed. Build upon existing (required) local stormwater program and (voluntary) school programs. Efforts to integrate more restrictive floodplain development requirements into local ordinances have not yet been successful, but through continued education the likelihood of passing such recommendations may prevail.

Further Analysis: A comprehensive stormwater retrofit analysis of at least one subwatershed area would help local programs and funding agencies to better justify expenditure of resources and document benefits of implemented projects. The City is required by the Neuse Stormwater Rules to identify several BMP sites; a systematic approach to project identification and prioritization for implementation would encourage funding participation by outside sources.

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<http://h2o.enr.state.nc.us/nps/>

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Data for this study were made available through DENR Center for Geographic Information and Analysis (downloaded in 2003), Division of Coastal Management (publication dates 2003, downloaded from the web May 2004), and Natural Heritage Program (April 2004);

NCSU Center for Earth Observation (November 2003);

City of Wilson, Department of Public Services, Geographic Information System (September 2003).

Floodplain mapping and elevation data are available for download at:

www.ncfloodmaps.com

USGS Topographic Maps (1998), Wilson and Winstead Crossroads, NC.

A separate data list and compendium of GIS shapefiles will be available as part of the final report submitted.

Historical aerial photos were available for viewing at the Wilson County NRCS offices.

Appendix A

Advisory Group

Three meetings were held during 2003 to solicit input and assistance from local area natural resources agency staff. The following groups participated in the meetings:

City of Wilson Stormwater Services
City of Wilson Public Services/Engineering
Wilson County Cooperative Extension Service
USDA Natural Resources Conservation Service (Wilson County)
Neuse River Foundation
Green Engineering (a local engineering contractor)

NC State University's Watershed Education for Communities and local Officials (WECO) facilitated the meetings. The purposes of these meetings were to review assessment data and gather additional information, gather insight into local program priorities, to help set goals for the planning effort, and to assist in site visits. A public meeting was held in December, 2003, to solicit input from the community. Meeting minutes are available on WECO's website at: www.ces.ncsu.edu

Goals of Watershed Planning

There were a number of problems discussed during meetings with local resource agency staff. There was a rather exhaustive list of goals to work towards, including water quality and habitat improvements, education, land use and open space planning, and identifying funding sources for projects. Some of these goals are being addressed by the local agencies, and can be enhanced through application of additional resources. Below are listed objectives for this Local Watershed Planning Group, as discussed at meetings in 2003:

1. Improve Water Quality

Objectives:

Reduce sediment input

Improve floodplain function

Incorporate water quality BMPs into residential development (new & retrofits)

Identify specific pollutant concerns in subwatersheds (nutrients, sediments)

Develop monitoring for watershed, to aid in determining extent of current problems and as basis for improvements

Storm flow and peak flow reductions

Maintain/upgrade sanitary sewer collection and treatment systems

Identify optimal sites for traditional and non-traditional watershed restoration projects

2. Restore Physical Habitat

Objectives:

Restore riparian buffers, channelized streams, impacted wetlands, instream & riparian habitat

Restore and construct additional wetlands

Permanently protect threatened streams

3. Engage and Educate the Public & Government

Objectives:

Provide greater awareness of development impacts

Educate public on why change is needed

4. Implement Land Use Planning

Objectives:

Prioritize areas with greatest need for action

Establish land uses to protect creeks

Open space protection

Enhance Recreation & Open Space Planning

5. Encourage Community Stewardship

Objectives:

Establish/enhance riparian buffers throughout the watershed

Initiate wetlands preservation

Preserve greenway/wildlife corridors

Litter abatement

6. Develop Implementation Strategy

Objectives:

Develop watershed monitoring program, education sites

Support integrated resource planning

7. Identify Potential Funding Sources

NC DENR EEP, CWMTF, 319, Stormwater Utility, Resource Cons. & Dev. grants

While it was not possible to accomplish all of the goals and objectives discussed by the advisory team, the meetings did provide a forum to identify needs and ideas for future efforts.

Appendix B

Hominy Swamp Creek Watershed Assessment and Restoration Plan

Analysis of Funding Sources

There are several major components of a watershed restoration plan. A complete plan should include an assessment of the watershed's existing conditions, note changes occurring in the watershed, identify causes of watershed degradation, make strategic recommendations that address how to achieve watershed improvements, and locate specific areas to implement those strategies. One of the most important factors to consider once a watershed restoration plan has been completed is to decide how to finance the implementation of the recommendations developed in the planning process. The goal of this funding analysis is to identify potential federal, state, local and/or private funding sources that are available for implementing the recommendations of the Hominy Swamp Creek Watershed Assessment and Restoration Plan (Plan). The funding sources identified and discussed below are examples of the many funding opportunities that are available for watershed improvement projects, though not a summary of all potential funding avenues for watershed projects. Funding opportunities discussed in this analysis include those that are deemed to be appropriate to address the watershed needs and opportunities specifically identified in this Plan, such as flooding, stormwater retention, nutrient management, and protection of existing high quality natural resources. These funding programs include North Carolina's Ecosystem Enhancement Program and Clean Water Management Trust Fund; the US Environmental Protection Agency's Clean Water State Revolving Fund and Clean Water Section 319 grants; the United States Department of Agriculture's Watershed Protection and Flood Prevention Program; and the Conservation Reserve Enhancement Program.

This analysis also explores the ability to combine available funding from several potential sources in order to implement as many of the recommendations as possible. For example, if a local government is able to obtain and pool funding from several programs, there may be an opportunity to address several identified watershed concerns (nonpoint

source pollution, flooding, etc.) through the implementation of more comprehensive watershed restoration and improvement projects. Therefore, this analysis will also discuss ways to combine available funds in order to implement a comprehensive watershed improvement project.

North Carolina Ecosystem Enhancement Program

The Ecosystem Enhancement Program (EEP, formerly the Wetlands Restoration Program) is established within North Carolina's Department of Environment and Natural Resources. The mission of the program is to "restore, enhance, preserve and protect the functions associated with wetlands, streams and riparian areas, including but not limited to those necessary for the restoration, maintenance and protection of water quality and riparian habitats throughout North Carolina." EEP administers several distinct programs to mitigate for impacts to North Carolina's natural resources. Each of these programs, as discussed below, is a source of funding for watershed improvement projects including those that address degraded streams, wetlands and riparian buffers, stormwater, flooding and general water quality issues.

In-Lieu Fee Program

Through a 1998 Memorandum of Understanding with the United States Army Corps of Engineers (USACE), Wilmington District, the EEP funds, plans, implements and manages restoration projects that compensate for development-related impacts to streams and wetlands. EEP is not a grant program; EEP manages a repository of funds [Wetlands Trust Funds (for Wetland Restoration, Compensatory Mitigation, or Riparian Buffers)] that can be used for the restoration, enhancement, preservation and creation of wetlands and riparian areas in accordance with the program's Watershed Restoration Plans. The funds in the repository are a combination of state government appropriations, donations of property, grants, and payments made to satisfy mitigation requirements (NCDENR/USACE, 1998). The EEP In-Lieu Fee program has implemented numerous stream and wetland enhancement and restoration projects throughout the state and continues to serve as potential funding source for watershed-based restoration projects.

EEP funded projects are implemented in an effort to improve a multitude of watershed conditions. By reshaping and stabilizing eroded banks and reestablishing and/or maintaining a riparian buffer, one can expect a reduction in the amount sediment input into the stream. Meandering altered or straightened stream channels to a more natural pattern can reduce the velocity of high stream flows. Properly locating and constructing appropriate stormwater best management practices (BMPs) can result in increased flood storage, reduced hydrological peaks and increased pollutant removal. Each of the scenarios above have been identified as both existing watershed concerns and potential watershed improvement projects in the Plan, and are suitable for funding by the EEP. EEP evaluates any potential project based on specific criteria. Additional merit is granted to projects that are located in targeted watershed areas and that have the potential to improve impaired waters (such as Hominy Swamp Creek). Integrating wetland or riparian area restoration components with Section 319-funded projects (or those funded by other programs) will often improve the overall water quality benefits of the project (NCDENR DWQ, 2002). In an effort to ensure long-term protection, it should be noted that any project that is implemented by EEP for the purpose of compensatory mitigation must be protected in perpetuity by either fee simple acquisition or through a permanent conservation easement (NCDENR, 1999).

Riparian Buffer Restoration Program

Effective August 1, 2000, the North Carolina Environmental Management Commission permanently adopted rules to protect 50-foot vegetative buffers along waterways in the Neuse River Basin (as well as more recently in the Tar-Pamlico River Basin and the main stem and major lakes of the Catawba River Basin; however, since the Plan addresses the Hominy Swamp Creek watershed within the Neuse River Basin, this funding analysis will refer only to those rules applicable to the Neuse River Basin). The purpose of the riparian buffer rule is to maintain the nutrient removal function of natural riparian areas along stream corridors (15A NCAC 2B .0233). Development-related impacts to buffers directly adjacent to surface waters (intermittent and perennial streams, lakes, ponds) in the Neuse River basin can, with approval from the Division of Water Quality (DWQ) and EEP, be offset via payment to the Wetlands Trust Fund (Riparian Buffer Restoration

Fund) administered by EEP. EEP uses money from the fund to restore riparian buffer areas by planting native vegetation along riparian corridors and protecting those planted areas by either fee simple acquisition of the land, acceptance of donated land, or through conservation easements. Buffer restoration projects should include a minimum 50-foot buffer adjacent to both sides of the stream (from top of bank) and EEP can provide funding for the protection of up to three hundred feet from the stream. Riparian buffer projects often complement stream restoration projects, but can also be implemented as stand-alone projects.

The Hominy Swamp Creek Watershed Assessment and Restoration plan concludes that “greater than 25% of the 50’ riparian buffer and 30% of the 100’ buffer are no longer maintained in a forested condition” in this watershed. The Plan further states that it “is widely recognized that a 50’ forested riparian buffer (and preferably wider) serves many beneficial functions, including assimilating certain nonpoint source pollutants carried in overland flow, slowing such flows and allowing for infiltration and riparian corridor habitat” (NCDENR EEP, 2004). Based on the statistics above, there appears to be ample opportunity and need for buffer restoration in this watershed.

Nutrient Offset Program

As required by the *Nutrient Sensitive Water Management Strategy: Basinwide Stormwater Requirements* (15A NCAC 2B .0235), fifteen local governments within the Neuse River basin in North Carolina are required to implement a plan to address nitrogen reduction for existing and new development. The City of Wilson (within the Hominy Swamp Creek watershed) enacted their state-approved plan in 2002, which requires a 30% reduction in nitrogen export, no net increase in peak flow leaving a new development site from the predevelopment conditions for the one year-24 hour storm event and maintaining existing riparian buffers (NCDENR WRP, 2003). In order to meet the 30% reduction goal, developers can implement various stormwater BMPs. They also have the option of partially offsetting their nitrogen loads by making payment to the EEP’s Wetland Restoration Fund. Monies paid to this fund pursuant to [the] Rule shall be targeted towards restoration of wetlands and riparian areas within the Neuse River

Basin (NCDENR DWQ, 2003). EEP is presently working with local governments (including the City of Wilson as part of this Plan) to identify proposals for projects that will result in reduced nitrogen loadings to surface waters. Using the money available in the Fund, EEP can provide assistance to subject local governments to implement nitrogen removal projects, such as stormwater BMPs and constructed wetlands.

Clean Water Management Trust Fund

In 1996, the North Carolina General Assembly established the Clean Water Management Trust Fund (CWMTF) to help local governments, state agencies and conservation non-profit groups finance projects to protect and restore surface water quality (CWMTF, 2004). The CWMTF is a voluntary incentive-based water quality program. Projects funded by the CWMTF are intended to specifically address water pollution problems and focus on upgrading surface waters, eliminating pollution and protecting and conserving unpolluted surface waters (North Carolina General Statutes § 113-145.1). Program funding has historically been granted for projects such as land acquisition of riparian buffers and greenways, restoration of degraded lands, stormwater control projects, wastewater improvement projects, and water quality planning (NCDENR, 1999).

Those interested in obtaining funding from the CWMTF must submit an application, which may be obtained from the program's web site at www.cwmtf.net. Applications are accepted and reviewed twice per year, in June and December. The applicant is not required to provide a funding match, though a match is recommended. The funding match may be satisfied by means such as a cash value match, fee simple donation of land to a public or private nonprofit conservation organization, or in-kind services ("sweat equity") (CWMTF, 2004).

By rule, grants obtained from the CWMTF may not be used to satisfy compensatory mitigation requirements [NCGS § 113-145.4(c)]. However, as part of the application review and ranking process, the CWMTF may assign a higher priority to projects that are linked to *other conservation projects* in the region or watershed (CWMTF, 2004). The

rule does not state that the *other conservation projects* may not be compensatory mitigation projects. Additionally, CWMTF has adopted a Resolution stating, in summary, that lands previously acquired by CWMTF may be used for complimentary mitigation projects as long as the project improves water quality and the sponsor of the mitigation project reimburses CWMTF for their (CWMTF's) original investment in the acquired land (CWMTF, 2002). Preference is also given for projects that target impaired waters identified by the Division of Water Quality and that appear on the 303(d) list, as does Hominy Swamp Creek (DWQ, 2004).

In the case of this Plan, it may be feasible to apply for and receive CWMTF monies for wetland systems that are contained within the headwaters of the watershed. Downstream of these protected areas, another funding source (such as EEP or EPA 319 grants) may be pursued for implementation of stream channel restoration or stormwater BMP implementation along Hominy Swamp Creek. Combining funding sources and linking complementary conservation projects will not only make a potential project more appealing to an agency or group that is reviewing an application for funding, but will also likely result in measurable watershed improvements by addressing multiple watershed concerns.

US Environmental Protection Agency Clean Water State Revolving Fund

The US Environmental Protection Agency's (EPA) Clean Water State Revolving Fund (SRF) was created by Congress as part of the 1987 Clean Water Act Amendments. The funding is available to all 50 states, and each states manages their own program according to the state's water quality priorities (USEPA, 1997). The program works by primarily offering low-interest loans for agricultural, rural, and urban runoff control, wet weather (stormwater) flow control, and alternative treatment technologies. As those who have received funding repay loans, the money is reused (revolved) to provide assistance for future water quality projects. Examples of projects that have been funded by the SRF program include stormwater management facilities (sediment basins and constructed

wetlands), purchase of easements for wetland conservation/protection, and rehabilitation of streambanks, riparian corridors and buffers (USEPA, 2003).

The SRF is an appropriate potential funding source for protecting the Hominy Swamp Creek watershed's headwater wetlands either by fee-simple purchase or easement acquisition of these areas. Permanent protection of these headwater areas is "a main goal of this planning effort, as many wetland features have been compromised over time, and development too close to and in the floodplain has caused major flooding events and heightened awareness of flood potential" (NCDENR, 2004). The SRF may also be used to support the recommendations of this plan by funding the construction of stormwater BMPs and agricultural BMPs that address agricultural runoff, erosion control and chemical or nutrient use reduction (USEPA, 2003). By implementing these strategies, an expected reduction in pollutant loading can be achieved in the Hominy Swamp Creek watershed.

Funding from the SRF is not only available to government organizations, but also non-profit organizations, businesses, farmers, homeowners and watershed groups. In order to be eligible for funding, the project must help implement the state's Nonpoint Source Management Plan (319 Plan) under the Clean Water Act (USEPA, 2003). No match is required, and loans can cover up to 100% of the project cost. Loans issued to any one local government under this program may not exceed \$7,500,000 per fiscal year and the maximum maturity on any loan under this program is 20 years (NCDENR, 1992).

Options for repayment of the loan including assessing utility fees, stormwater management fees, dedicated portions of taxes, developer fees, etc. (USEPA, 2003).

US Environmental Protection Agency Section 319 Grant Program

The Environmental Protection Agency (EPA) Section 319 Grant Program (319 Program) is a national program to address and reduce nonpoint source pollution (USEPA, 2003). In North Carolina, the NCDENR Division of Water Quality's (DWQ) NonPoint Source Planning Unit administers the 319 program. Projects eligible for consideration for 319

funding associated with this Plan include public education of nonpoint source concerns (e.g. stormwater runoff), demonstration projects related to controlling nonpoint source pollution (e.g. stormwater or agricultural BMPs), and monitoring to assess the success of specific nonpoint source projects. State and local governments, as well as public and private nonprofit organizations and institutions are eligible to apply for and receive 319 funds.

There are two types of funding currently available from the 319 program in NC: base and incremental. Base Funding can be used for on-the-ground type projects as well as broader educational and regulatory programs related to water quality protection or pollution prevention activities. Incremental Funding can be applied to projects whose goal is to restore waters that are listed as impaired (such as Hominy Swamp Creek) (NCDENR DWQ, 2004). Examples of previously funded 319 projects include installation of BMPs for animal waste; design and implementation of BMP systems for stream, lake and estuary watersheds; and basinwide landowner education programs (USEPA, 2004).

A funding match is required in order to be eligible for a 319 grant. The federal match of any project may not exceed 60%. Proposals that offer non-federal match funding above the required 40% receive additional credit when the proposals are evaluated. The reviewing agency encourages that proposals show a strong sense of collaboration and partnership with other state or local agencies for measurable nonpoint source reduction. For the purpose of this plan, pursuing partnership projects in conjunction with the State's Clean Water Management Trust Fund or the Ecosystem Enhancement Program is recommended. For example, either CWMTF or EEP could fund the acquisition of lands for preservation or restoration activities as well as the design and implementation of those activities. The 319 program could be used to fund monitoring the project in support of demonstrating measurable water quality improvements and public education of how to prevent further watershed degradation. Since both the CWMTF and EEP are nonfederal programs, the funding provided by those programs could serve as the funding match to the federal 319 grant. Again, collaborative efforts from several funding agencies can

result in a comprehensive watershed improvement project. In order assure long-term protection, on-the-ground projects should include establishment of conservation easements or other instruments (NCDENR NPS, 2003).

USDA Natural Resources Conservation Service - Watershed Protection and Flood Prevention Program

The Watershed Protection and Flood Prevention Program, also known as the “Small Watershed Program,” provides technical and financial assistance (cost sharing) to address resource and related economic problems on a watershed basis (USEPA, 2004). Those eligible to apply for assistance include state agencies, municipalities, soil and water conservation districts, tribal organizations and certain nonprofit agencies. The program funds many types of projects, including those being implemented and related to watershed protection, flood prevention, water supply, water quality, erosion and sediment control, wetland creation and restoration.

Projects are limited to watersheds containing $\leq 250,000$ acres, therefore, the Hominy Swamp Creek watershed qualifies based on its size of 15 square miles, or approximately 9,600 acres. Since one of the concerns noted in the Hominy Swamp Creek Plan is flooding and the associated resource and financial impacts caused by flooding, an opportunity exists to obtain partial funding for projects (via cost sharing) or technical assistance to address those concerns. This program also serves as a potential source for funding the acquisition of conservation easements to “perpetuate, restore and enhance the natural capability of wetlands and floodplains to retain excessive floodwaters” (USDA NRCS, 1990). The program will fund up to 50% of the cost of acquiring those easements.

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP) is a federal and state partnership that began in 1999. It is a voluntary program committed to riparian protection and wetland restoration of up to 100,000 acres within four designated Nutrient

Sensitive Waters Basin in North Carolina, including the Neuse River Basin (NCDENR DWQ, 2000). Partners in the program include the North Carolina Division of Soil and Water Conservation, the NC Clean Water Management Trust Fund, the Ecosystem Enhancement Program, and the United States Department of Agriculture. The goal of the program is to preserve up to 85,000 acres of active riparian area and 15,000 acres of wetland that are currently under active agricultural production. The program was created in part for the enhancement of water quality by reduction of sediment and nutrients, which also falls in line with two of the goals of the Hominy Swamp Creek Plan, sediment and nutrient management (CREP Agreement, 1999; NCDENR EEP, 2004).

The CREP program works by providing rental payments to landowners for removing environmentally sensitive land from agricultural production (NCDENR WRP, 1999). It is estimated that approximately 22% of the land included in the Hominy Swamp Creek watershed is agricultural land (NCDENR EEP, 2004). Eligible land can be enrolled in the CREP program via 10-year, 15-year, 30-year or permanent conservation agreements. Under the agreements, landowners agree to remove the lands from agricultural production and plant and maintain long-term, resource conserving vegetative covers. Payments are based on the duration of the agreement and the soil rental rate as calculated by the Farm Service Agency, and bonus incentives are awarded to those producers who enroll in permanent conservation agreements and those who plant trees (USDA, 1999). Cost sharing is also available from the Federal government for the installation of conservation practices. This program would be an appropriate source for funding to support protection efforts in areas of the Hominy Swamp Creek watershed such as sensitive headwater wetland and/or riparian areas that may be affected by agricultural production. Conservation practices such as grassed filter strips, riparian buffers and wetland restoration are allowable for receipt of funding from CREP. Since programs such as the EEP, CWMTF, and others previously discussed can also provide funding for these practices, here exists another opportunity to look at combining funding sources in support of achieving the goals of this Plan.

In summary, there are numerous funding sources available for watershed protection and improvement initiatives from local, state, federal and private organizations and alternative sources of funding are becoming important options for implementing environmental protection measures. While some of the funding sources listed above may require adherence to strict criteria in order to receive funding (i.e. permanent easements or funding match requirements), it should be noted that with creative thinking, funds received may be able to be combined, as several funding sources may be applicable to a particular project. It is recommended that any project that is constructed be permanently protected, whether by fee-simple acquisition, easements, or other methods. As repeated throughout this analysis, combining funding sources from several groups allows for the implementation of comprehensive watershed improvement projects that have the ability to achieve greater environmental benefits. Many other factors, not covered as part of this analysis, need to be considered when seeking funding for projects, such as capital and operating costs; cost-effectiveness; legal, administrative and political impacts of the alternatives; and costs for the on-going management of both funds received and projects implemented. However, it is hoped that this analysis will be used as a tool for identifying potential funding opportunities to pursue as part of the implementation of the Hominy Swamp Creek Watershed Assessment and Restoration Plan.

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Appendix C

Grant Description and Deliverables

EPA Wetlands Development Grant “Contentnea Watershed Wetlands and Riparian Area Restoration and Plan, Neuse River Basin”

Cooperative Agreement Number : CD984622-99

Beginning Date: September 1, 1999
End Date: December 31, 2004

Deliverables:

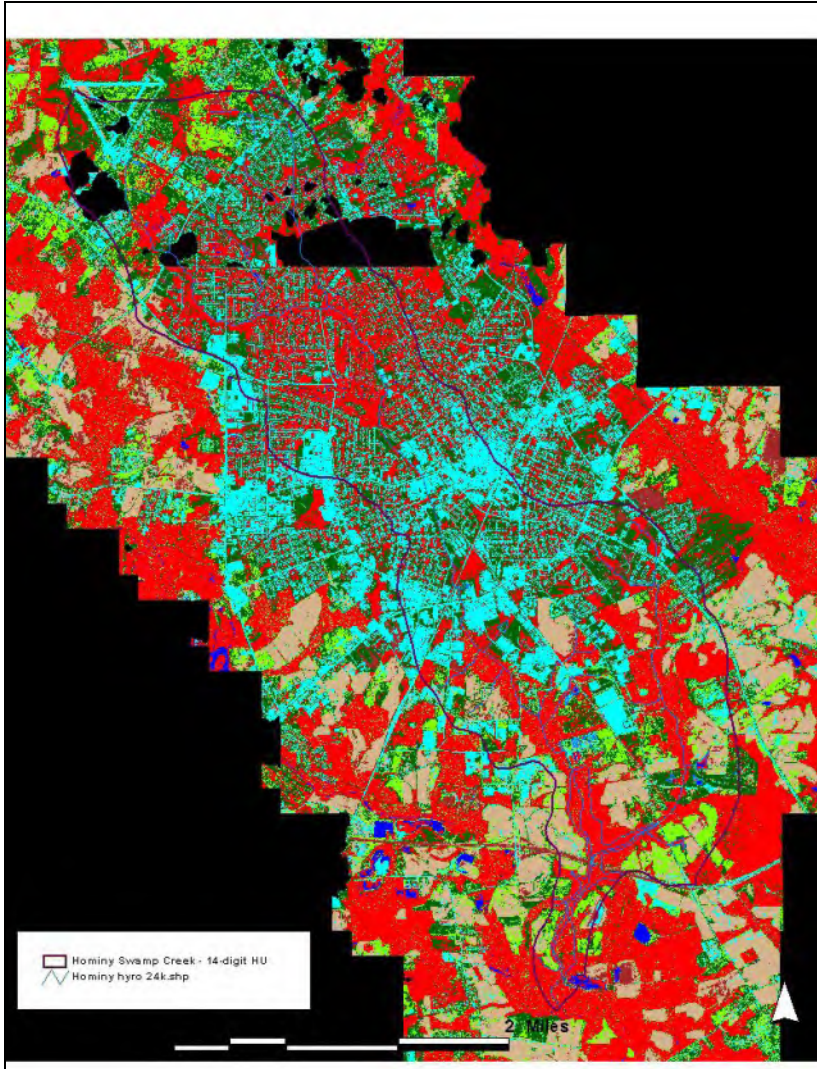
1. Watershed Assessment of one 14-digit hydrologic unit within the Contentnea Creek watershed : Comprehensive wetland and functional assessment maps, indicating use support status of streams, presence/absence of riparian buffers, land use/land cover data, natural resource data, and areas of concern due to anticipated changes in future land use (submitted herein).
2. Provide Assistance with the Development of Assessment Procedures to Determine Wetland Function (submitted separately by East Carolina University/EEP)
3. Watershed Restoration Plan (submitted herein):
 - a) Perform GIS investigation of watershed problems including potential problems associated with future development
 - b) Field verification of sources and potential restoration sites
 - c) Identification of needed solutions to current and future problems
 - d) Identification of key actions that can be taken by local government to address future land use threats and ensure the long term success of restoration projects
 - e) Identification of programs and funding sources that can address each needed solution
 - f) Public outreach and education materials to build support for implementation of watershed restoration plan
4. Monitoring and Assessment Program (submitted separately by East Carolina University/EEP)
5. Analysis of Funding Sources (submitted herein)

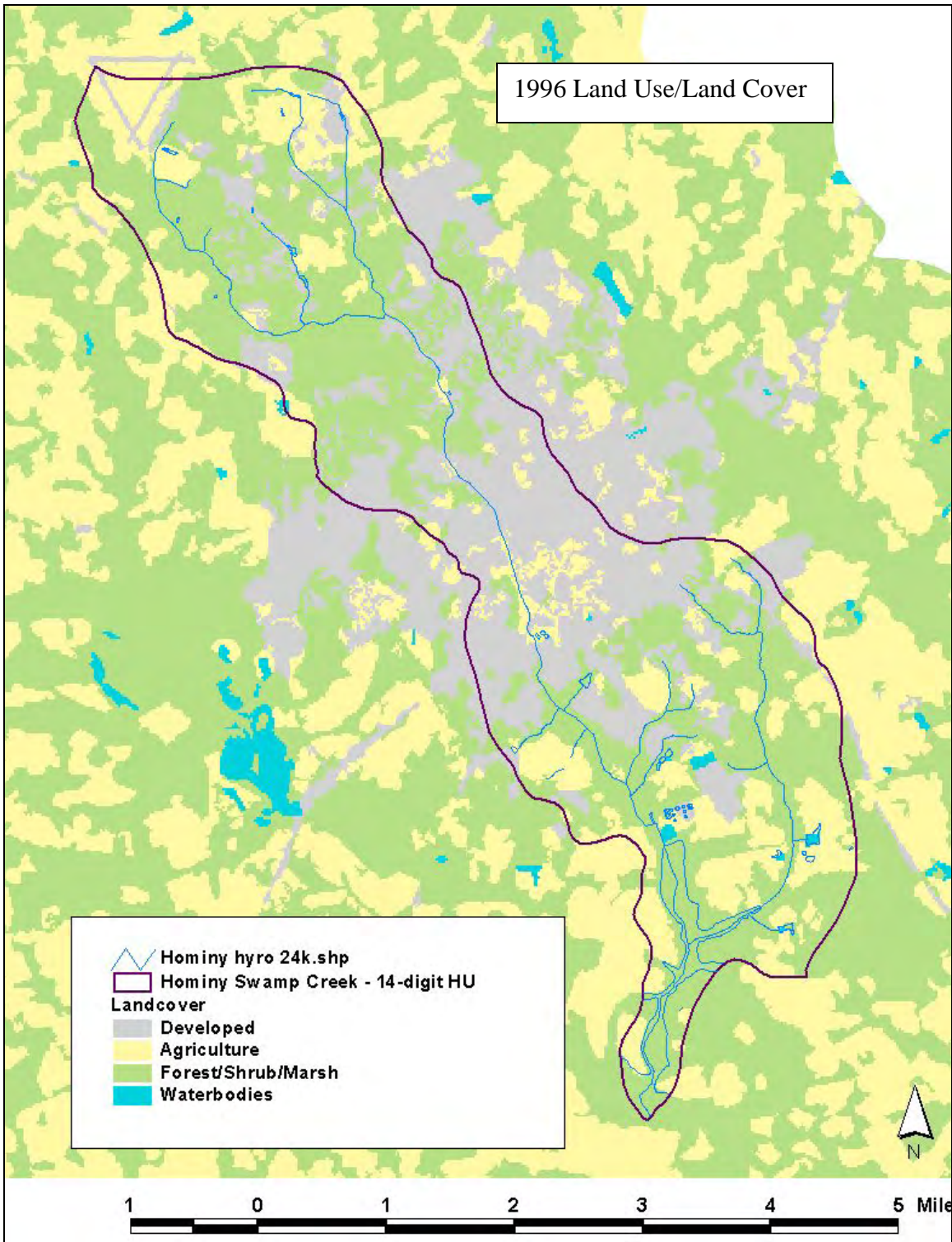
6. Implementation of Watershed Restoration Plan (stream restoration project implemented in 2001 in accordance with earlier plan developed by KCI; implementation of additional plan components underway)

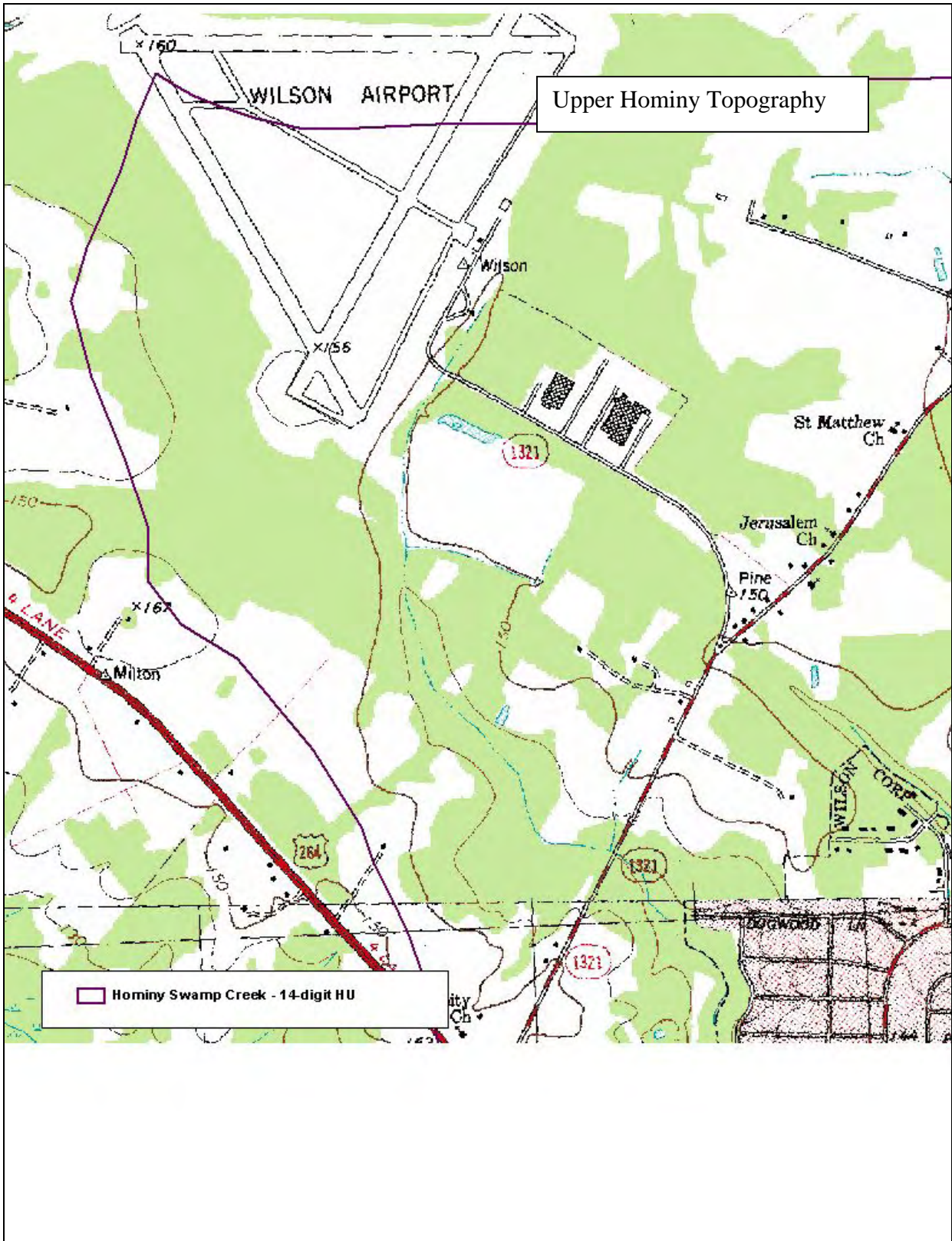
Appendix D

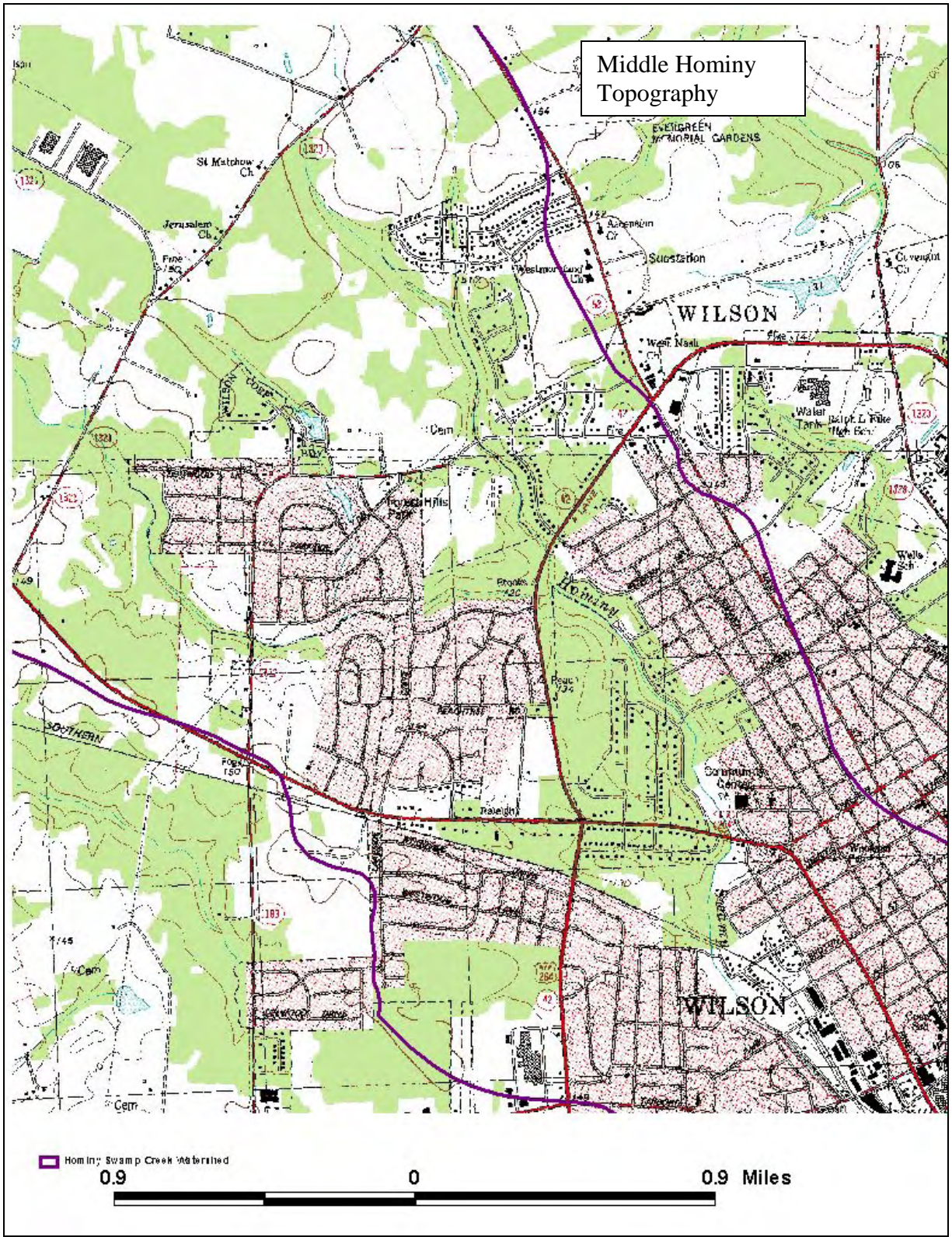
Additional Mapping Products

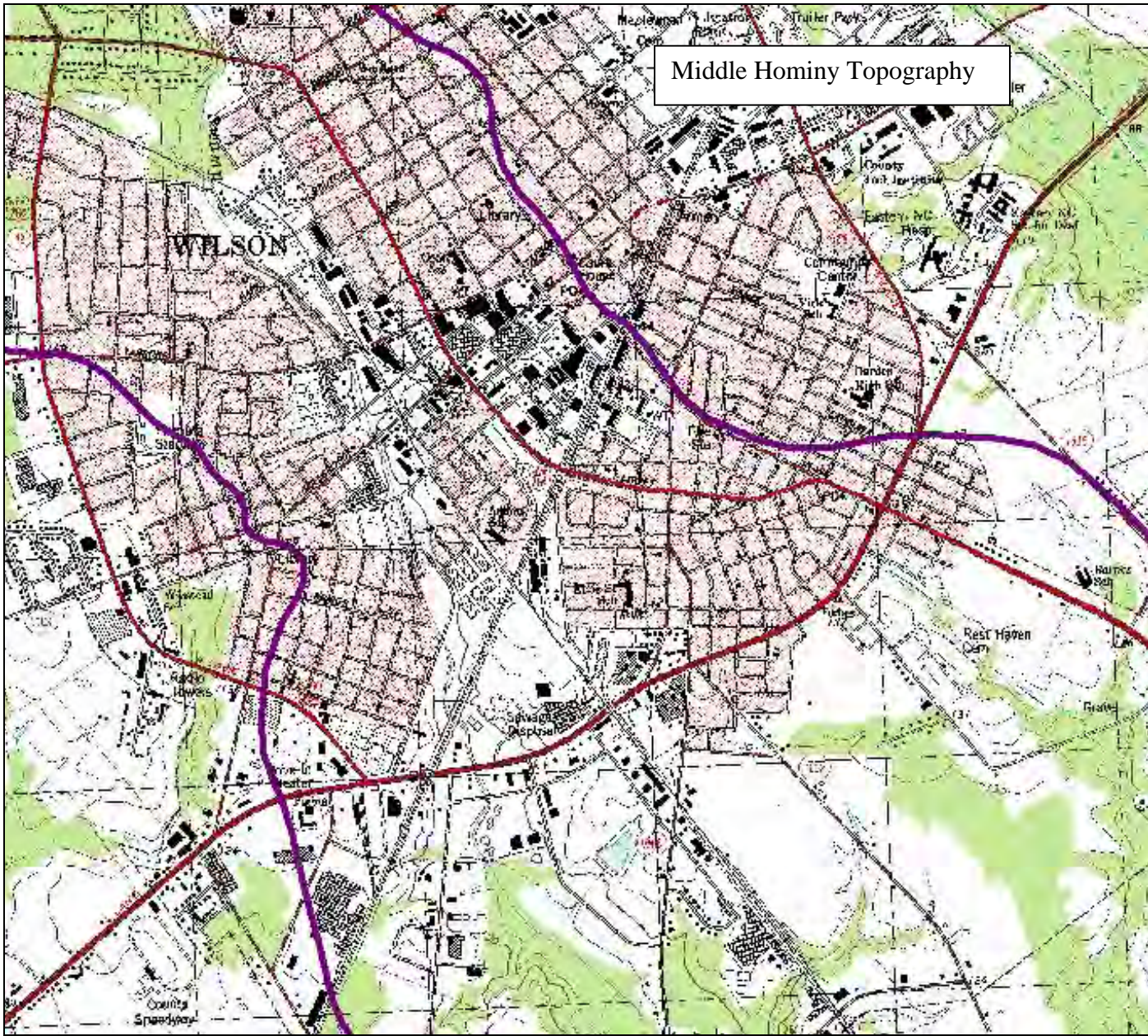
2003 Land Cover, developed by NC State University, Center for Earth Observation

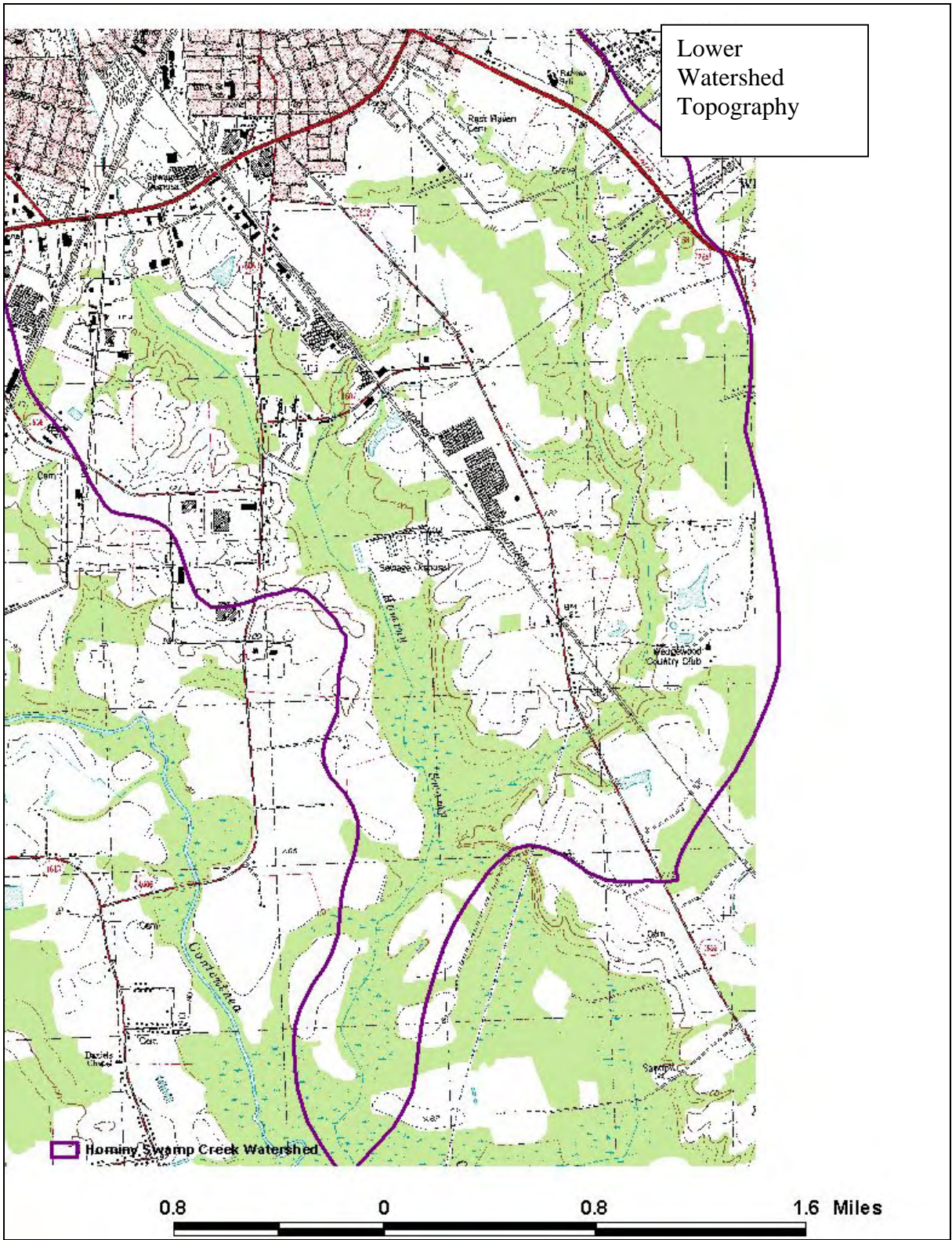


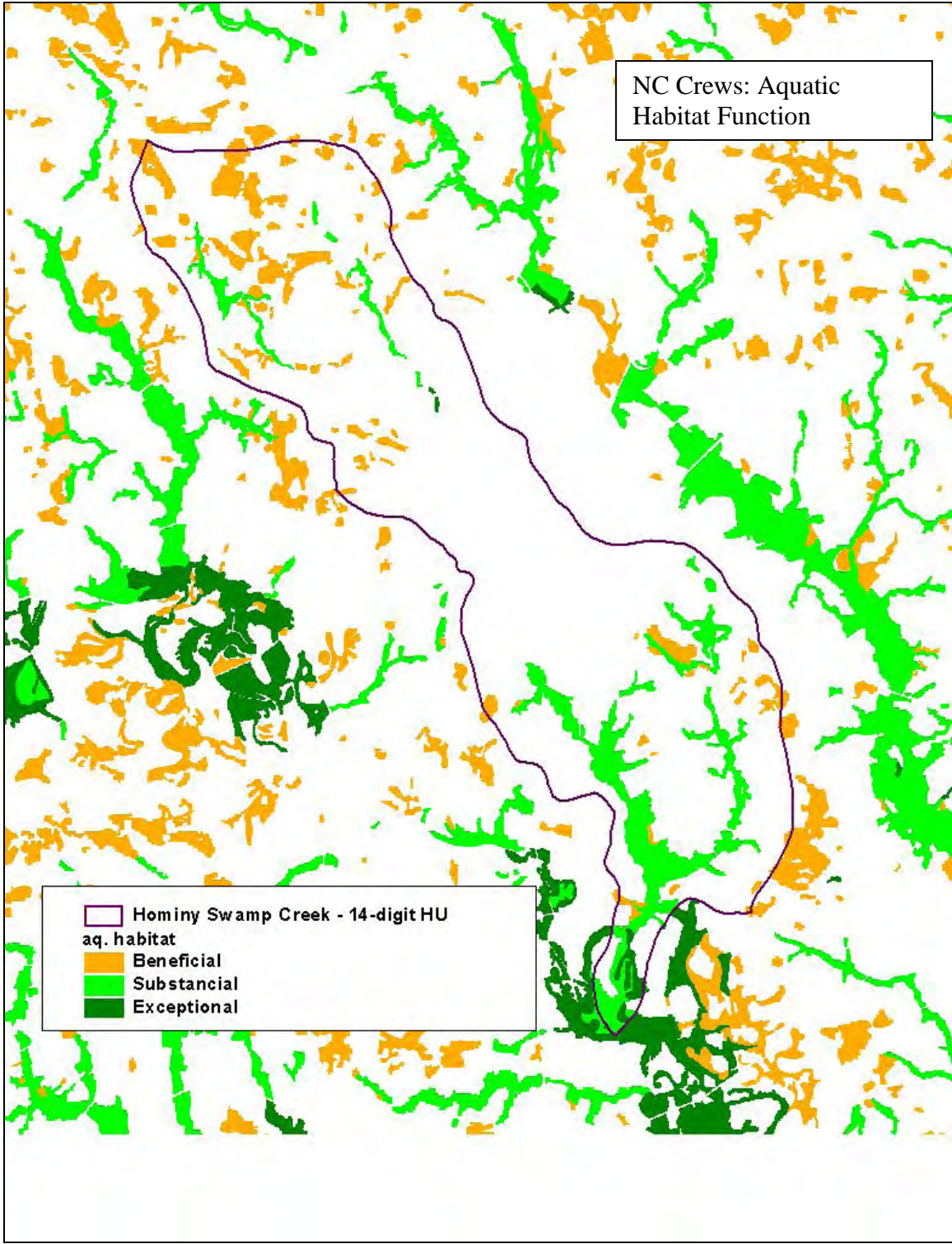


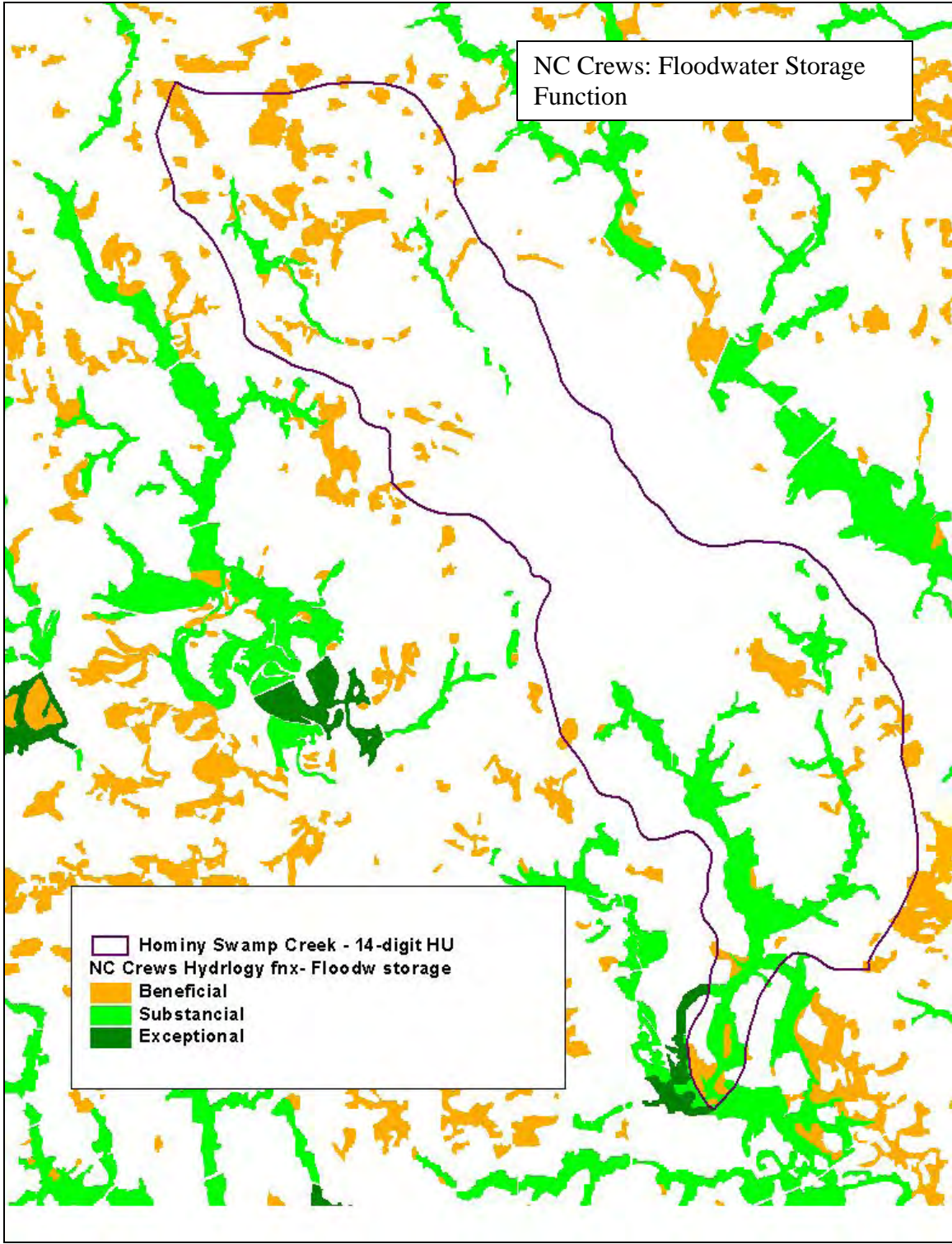


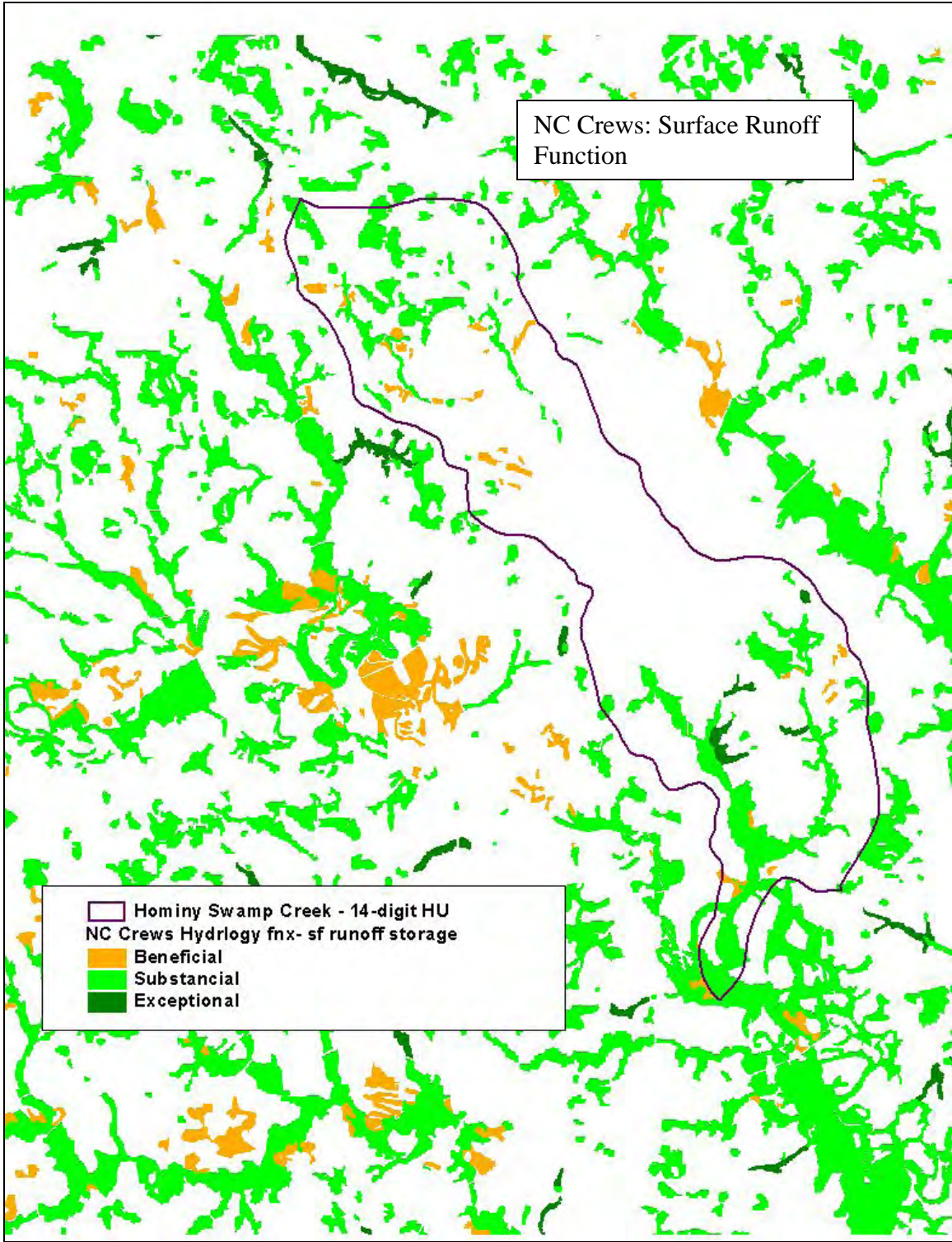


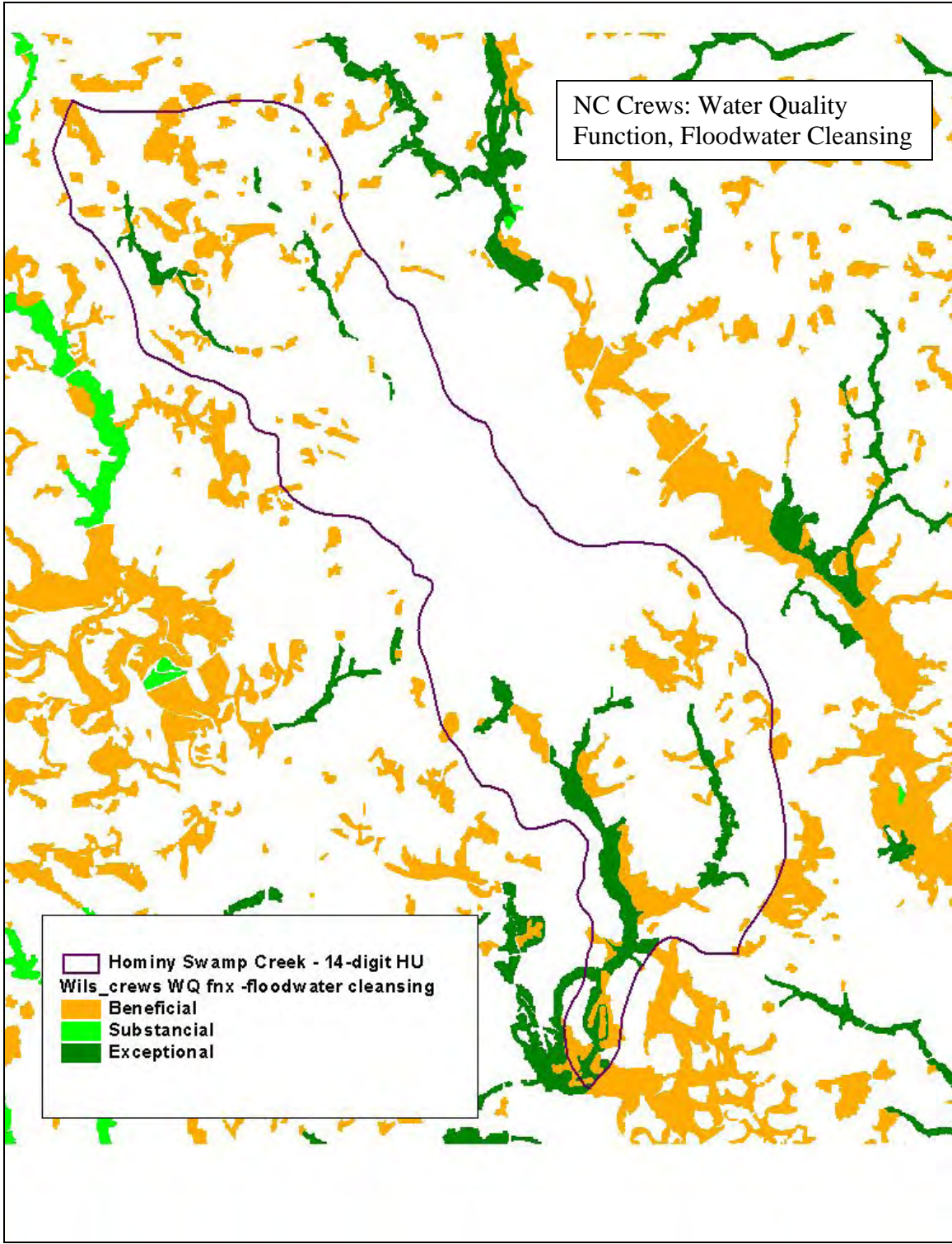


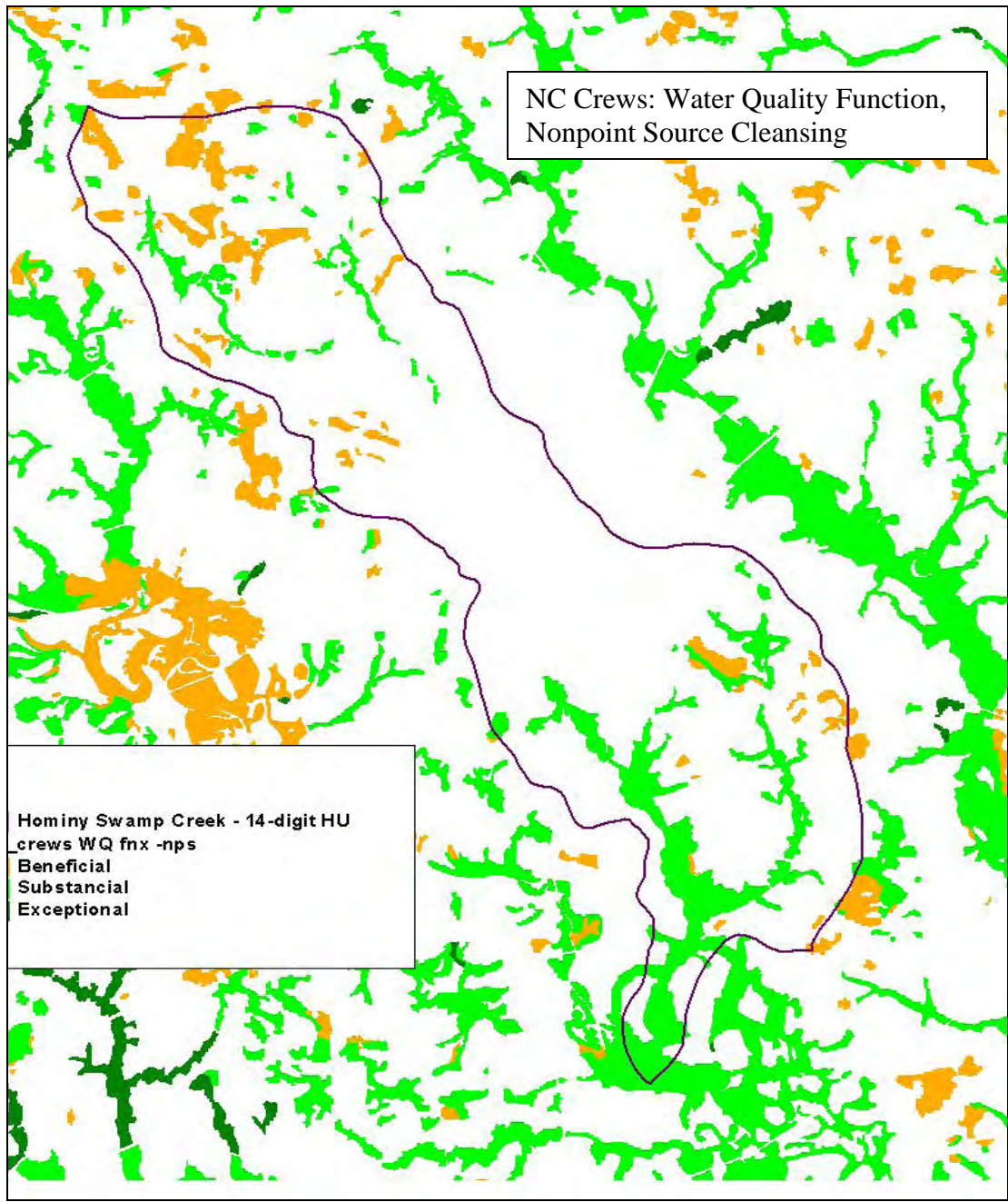


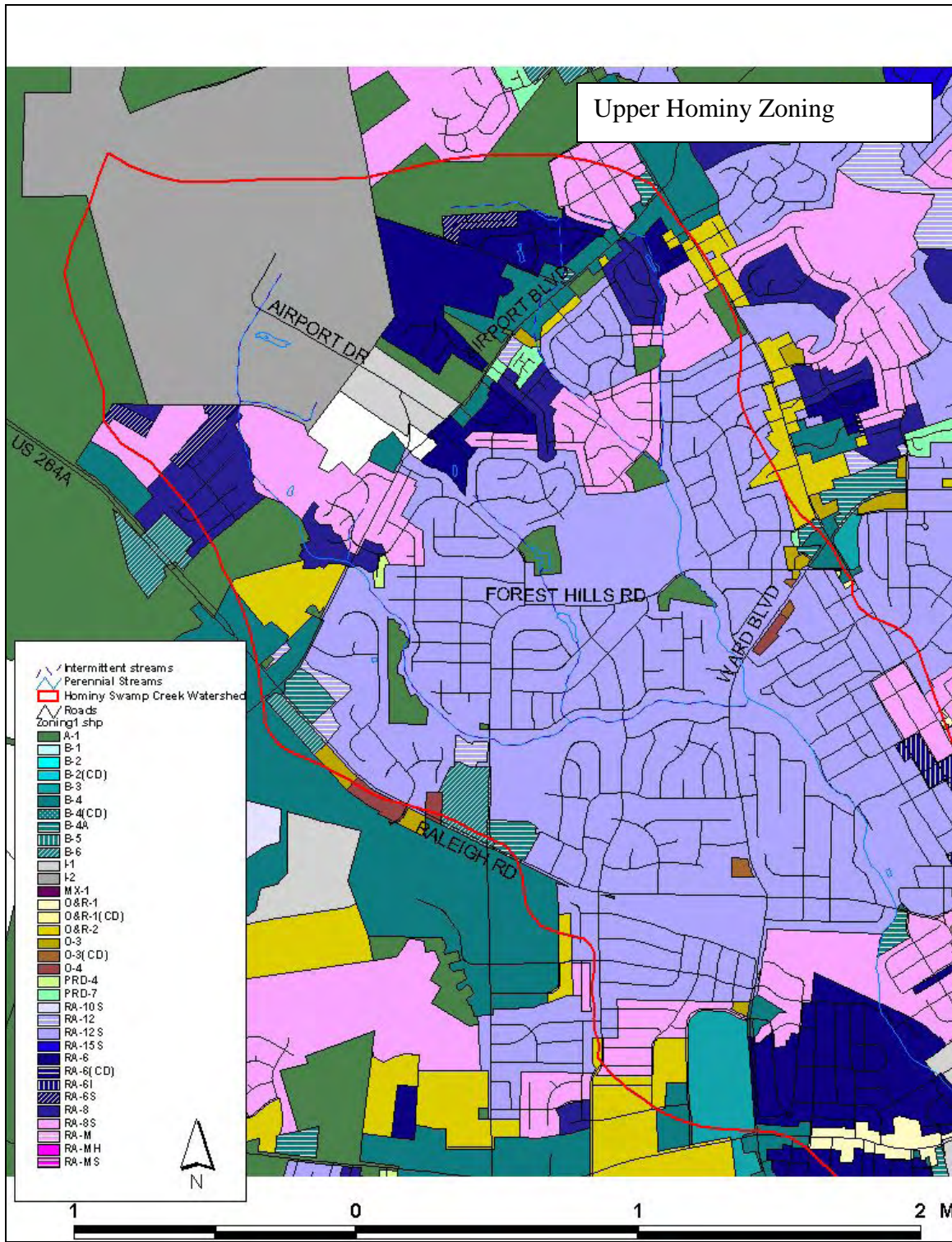


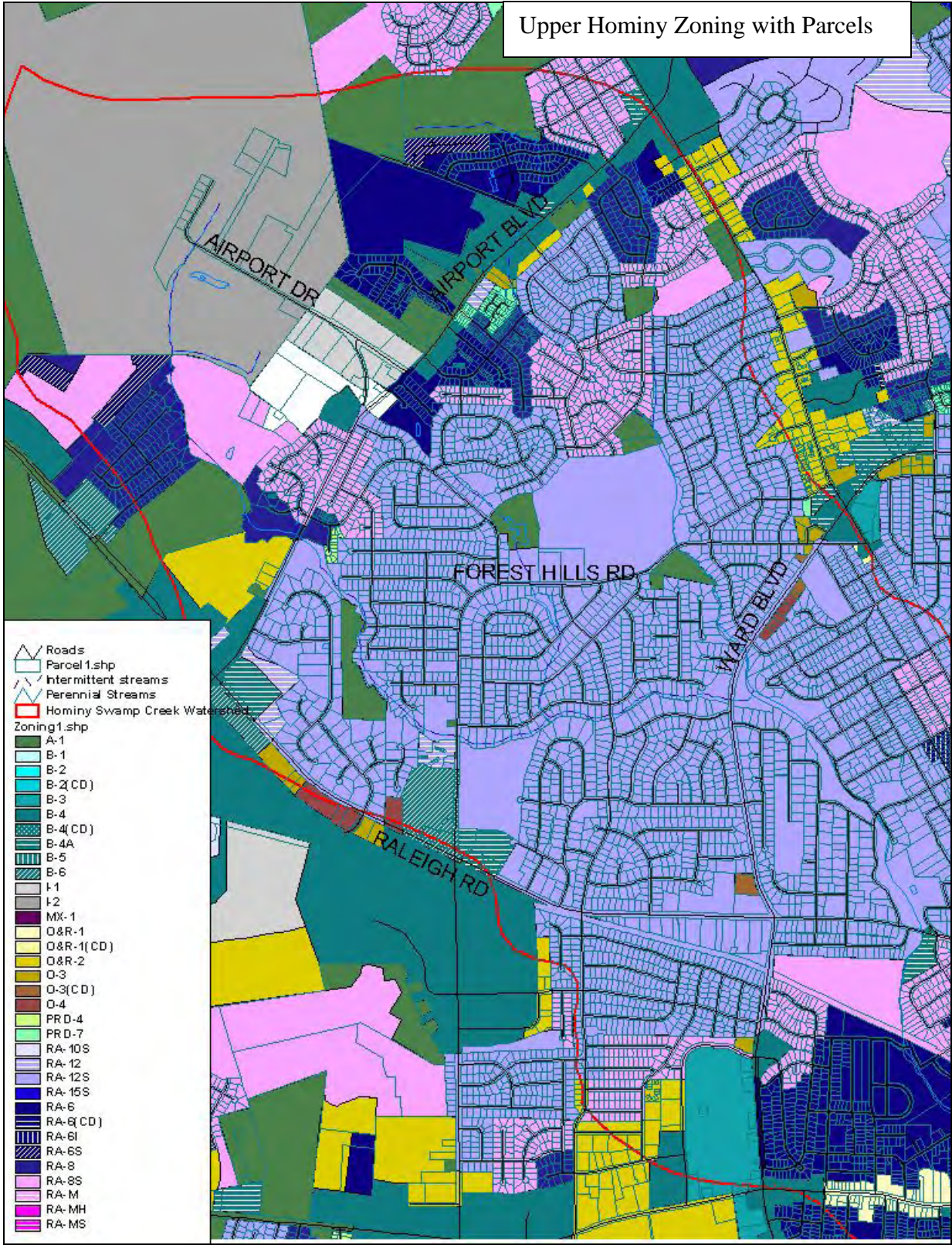


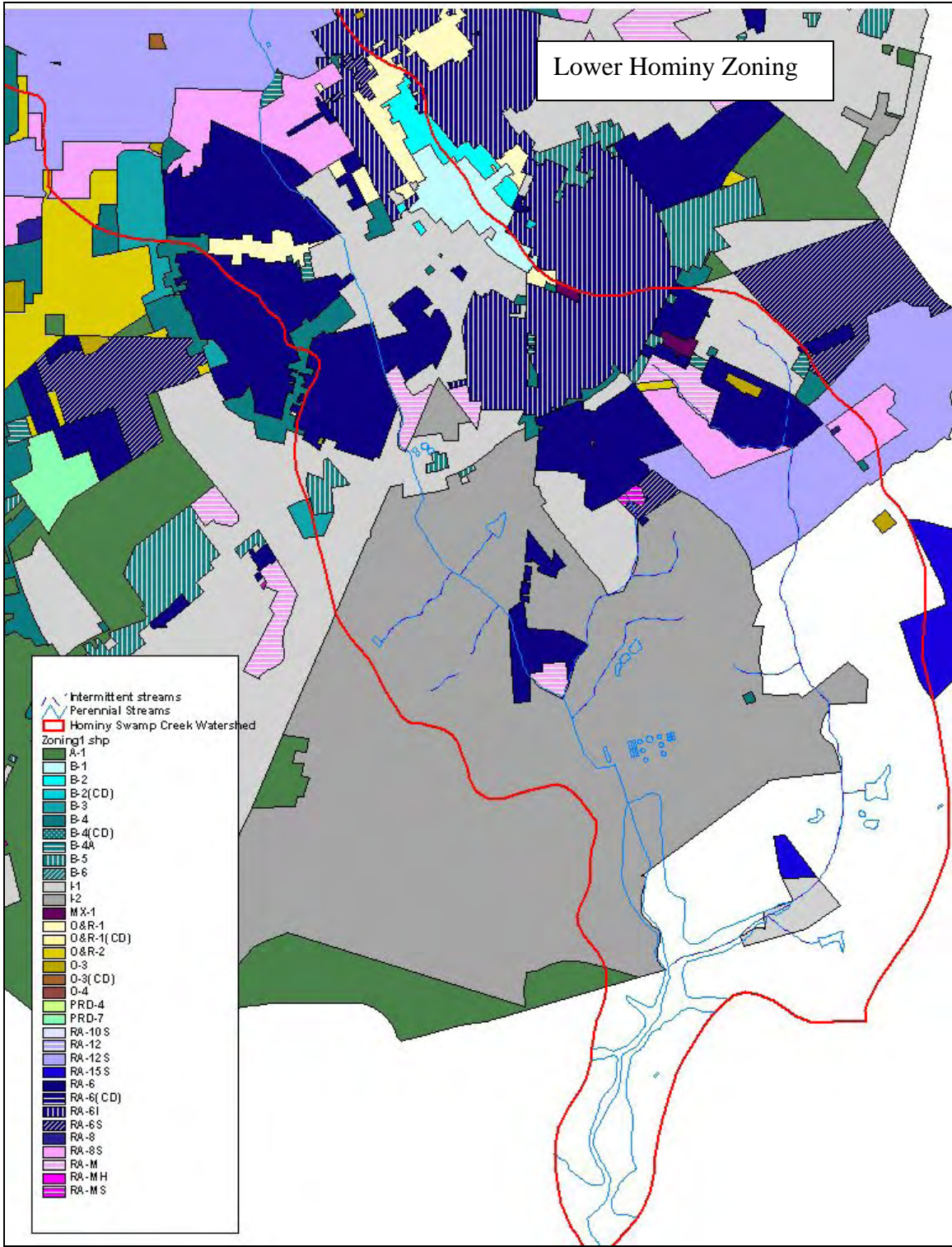


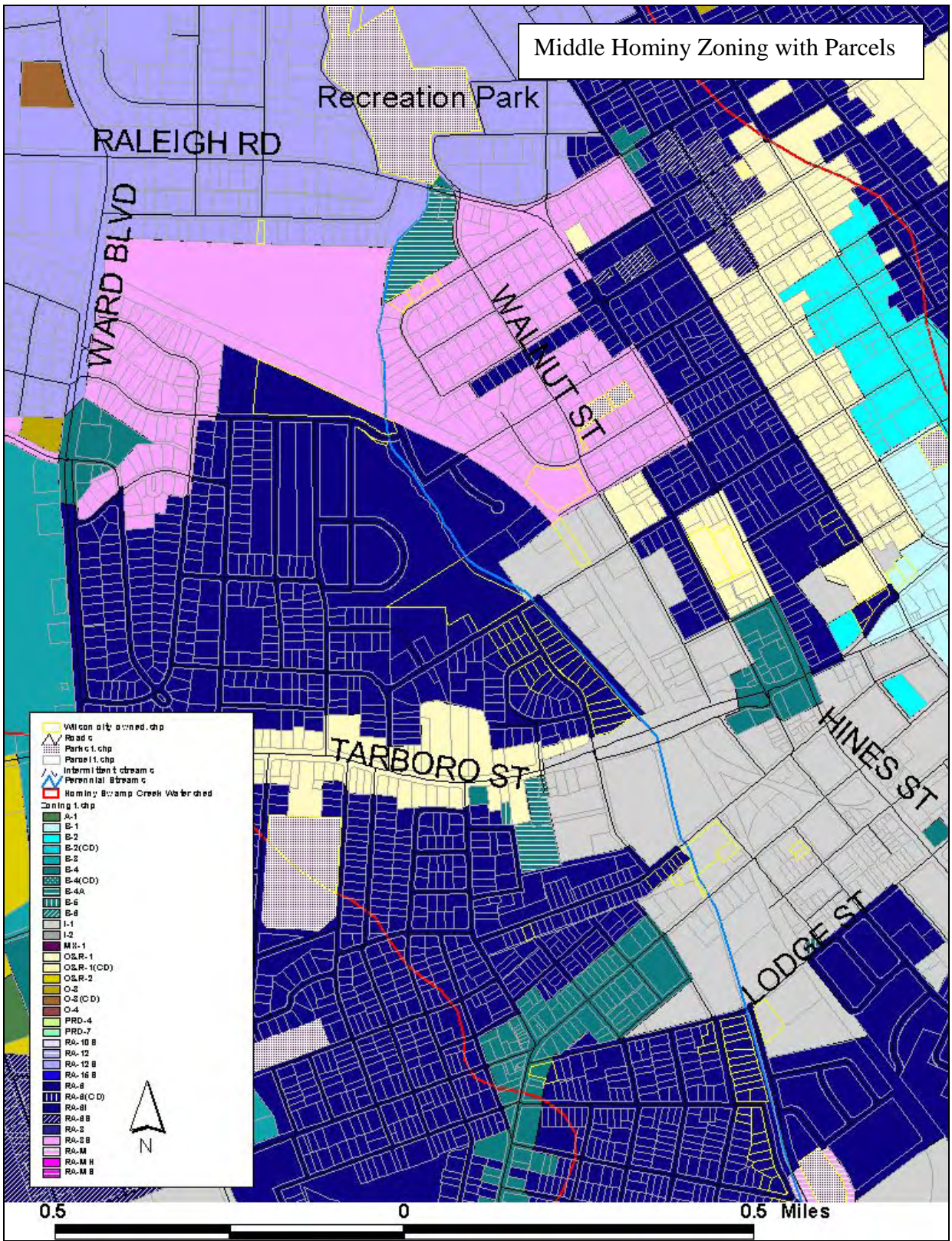


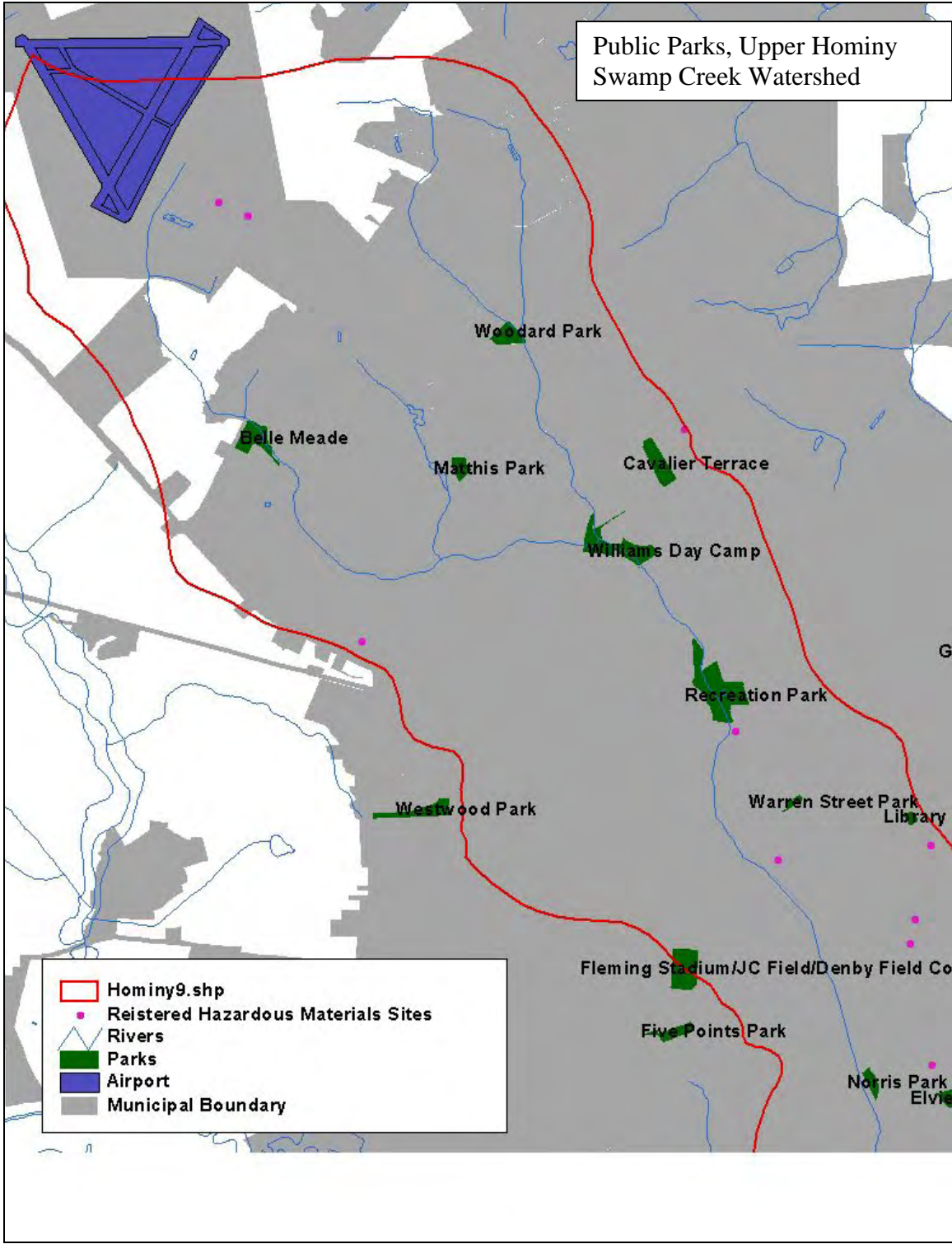




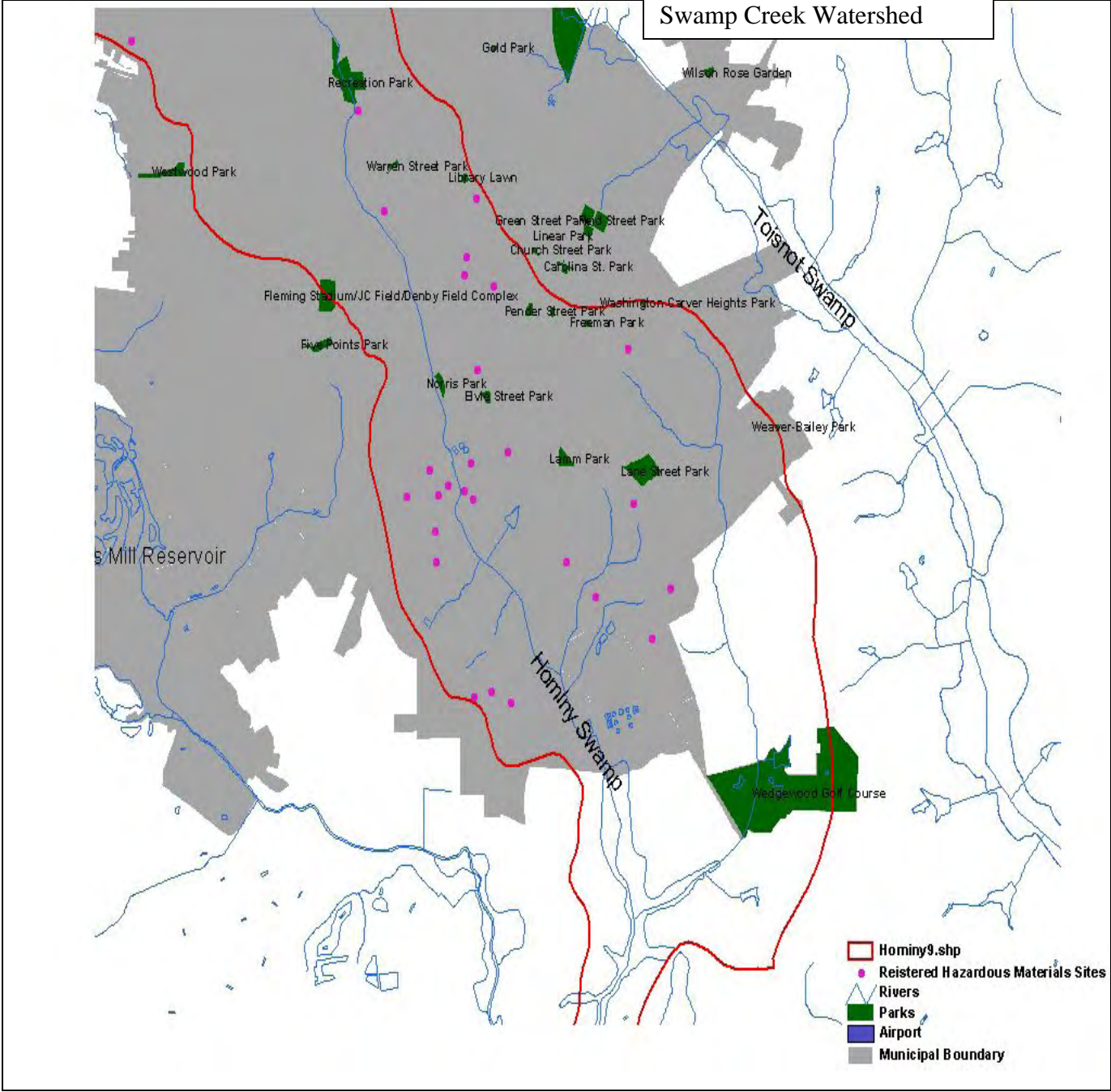








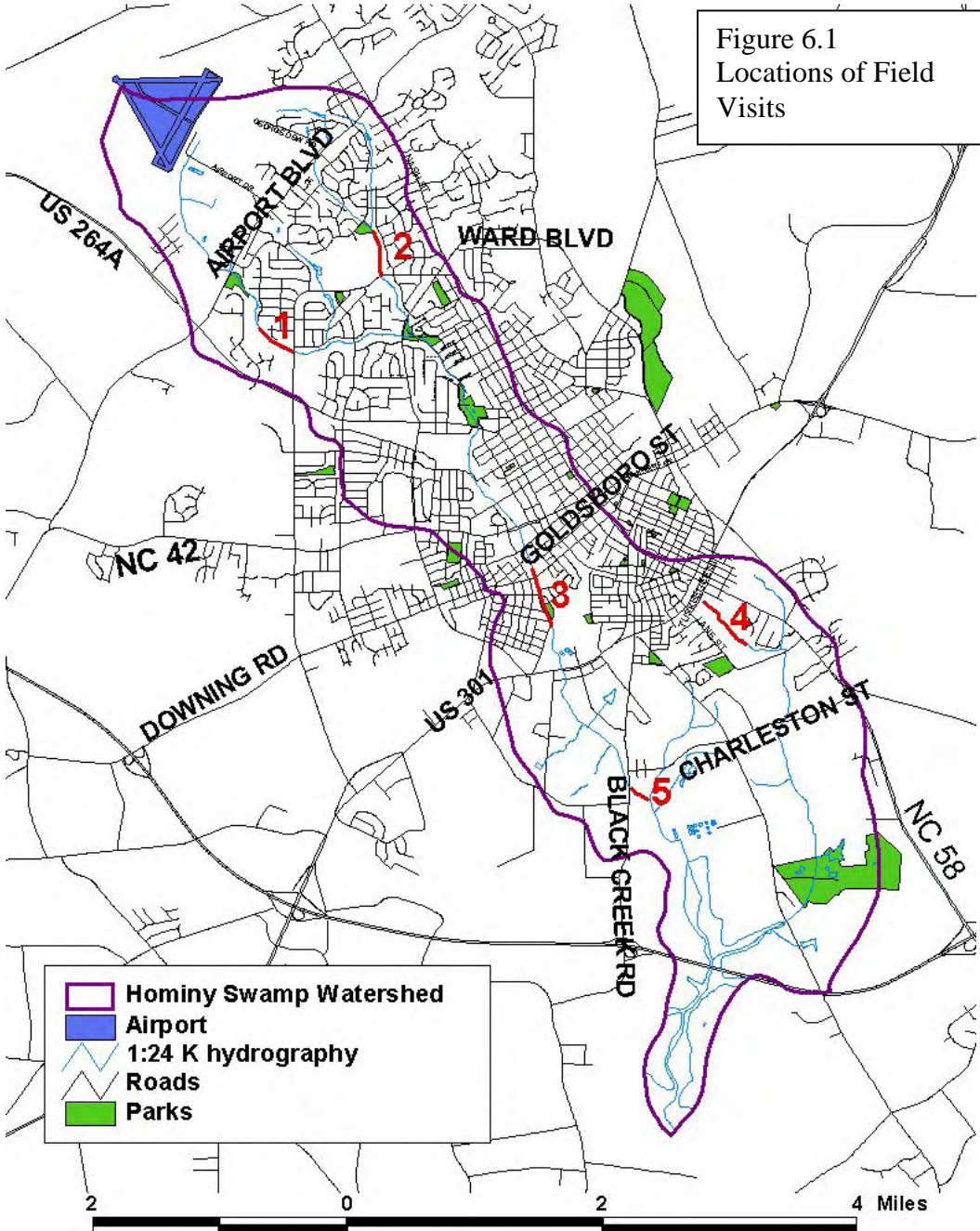
Public Parks, Lower Hominy Swamp Creek Watershed



Appendix E

Site Assessment Summary Sheets

All sites were visited during Summer and Fall 2003.



Site #1 Visual Assessment
Hominy Swamp Creek (HU 03020203020040)

Wilson, NC Neuse River Basin
 Tributary behind Forest Hills Baptist Church, at Forest Hills Road
 Primary Municipal Jurisdictions: Wilson, NC
 Receiving Water Body: Contentnea Creek
 300' section of stream with 150' buffer on each side of channel



Comments:
 Headcuts present; heavy sedimentation and erosion evident; forested buffer with many felled trees; heavy commercial areas with associated impervious cover within 500' of channel

Primary Land Use		Upland Buffer		Floodplain-Channel	
X	Forested	60%	Forested (% Cover)		Connection: Overbank Flooding
	Agricultural		Agricultural	X	Evident
	Residential	X	Managed Grass		Absent
X	Open Space/Vacant		Developed/Impervious		
	Industrial/Commercial		Vegetation Absent		Condition:
		X	Invasive Vegetation		Fair to Poor; Bank Instability Evident; Heavy Erosion and Incision Evident
					Encroachment:
	Adjacent Land Use:			X	Evident
	Residential, Commercial				Absent

Water Quality		Man-Made Features		Wetlands		Channel Blockages	
X	Cloudy, Turbid	U, D	Road Crossings	X	Present	X	Debris
	Obvious Odor	X	Utilities		Absent		Beaver Dam
	Residue Visible	X	Outfalls, Ditches				Other
			Pipes				
			BMPs				
			Dams				

Site #1 Visual Assessment



Site #2 Visual Assessment
Hominy Swamp Creek (HU 03020203020040)
 Wilson, NC Neuse River Basin
 Mainstem, at Canal Drive near Runnymede Road
 Primary Municipal Jurisdictions: Wilson, NC
 Receiving Water Body: Contentnea Creek



Comments:
 Headcuts present; heavy sedimentation and erosion evident; forested buffer with many felled trees; heavy residential areas with associated impervious areas within 500' of channel

300' section of stream with 150' buffer on each side of channel

Primary Land Use		Upland Buffer		Floodplain-Channel	
	Forested	60%	Forested (% Cover)		Connection: Overbank Flooding
	Agricultural		Agricultural	X	Evident
X	Residential	X	Managed Grass		Absent
	Open Space/Vacant	X	Developed/Impervious		
	Industrial/Commercial		Vegetation Absent		Condition:
			Invasive Vegetation		Fair to Poor; Bank Instability Evident; Heavy Erosion and Incision Evident
					Encroachment:
	Adjacent Land Use:			X	Evident
	Residential, Park				Absent

Water Quality		Man-Made Features		Wetlands		Channel Blockages	
X	Cloudy, Turbid	U, D	Road Crossings	X	Present	X	Debris
	Obvious Odor		Utilities		Absent		Beaver Dam
	Residue Visible	X	Outfalls, Ditches				Other
			Pipes				
			BMPs				
			Dams				

**Site #3 Visual Assessment
Hominy Swamp Creek (HU 03020203020040)**

Wilson, NC Neuse River Basin
Mainstem, at Meadow and Lodge Streets
Primary Municipal Jurisdictions: Wilson, NC
Receiving Water Body: Contentnea Creek
300' section of stream with 150' buffer on each side of channel



Comments:
Heavy sedimentation evident; forested buffer absent; channelized; residential structures removed from floodplain

Primary Land Use		Upland Buffer		Floodplain-Channel	
	Forested	0	Forested (% Cover)		Connection: Overbank Flooding
	Agricultural		Agricultural	X	Evident
	Residential	X	Managed Grass		Absent
X	Open Space/Vacant		Developed/Impervious		
	Industrial/Commercial		Vegetation Absent		Condition:
			Invasive Vegetation		Fair to Poor; Heavy Sedimentation Evident; Herbaceous & Shrub Veg. only
					Encroachment:
	Adjacent Land Use:			X	Evident (roads, no dev.)
	Vacant				Absent

Water Quality		Man-Made Features		Wetlands		Channel Blockages	
	Cloudy, Turbid	U, D	Road Crossings		Present		Debris
	Obvious Odor		Utilities	X	Absent		Beaver Dam
	Residue Visible	X	Outfalls, Ditches				Other
			Pipes				
			BMPs				
			Dams				

**Site #4 Visual Assessment Observation Location
Hominy Swamp Creek (HU 03020203020040)**

Wilson, NC Neuse River Basin
Black Creek Road, near Charleston Street
Primary Municipal Jurisdictions: Wilson, NC
Receiving Water Body: Contentnea Creek
300' section of stream with 150' buffer on each side of channel



Comments:
Heavy sedimentation and erosion evident; forested buffer on one bank; access to floodplain on forested side

Primary Land Use		Upland Buffer		Floodplain-Channel	
	Forested	40%	Forested (% Cover)		Connection: Overbank Flooding
X	Agricultural		Agricultural	X	Evident
	Residential		Managed Grass		Absent
X	Open Space/Vacant		Developed/Impervious		
	Industrial/Commercial		Vegetation Absent		Condition:
		X	Invasive Vegetation		Fair; Bank Instability Evident; Vacant area adj. floods frequently
					Encroachment:
	Adjacent Land Use:			X	Evident
	Ag., Vacant				Absent

	Water Quality		Man-Made Features		Wetlands		Channel Blockages
X	Cloudy, Turbid	U	Road Crossings		Present		Debris
	Obvious Odor	X	Utilities	X	Absent		Beaver Dam
	Residue Visible	X	Outfalls, Ditches				Other
			Pipes				
			BMPs				
			Dams				

Site #5 Visual Assessment
Hominy Swamp Creek (HU 03020203020040)

Wilson, NC Neuse River Basin
 Main Tributary to Hominy, at Tuskegee Street
 Primary Municipal Jurisdictions: Wilson, NC
 Receiving Water Body: Contentnea Creek
 300' section of stream with 150' buffer on each side of channel



Comments:
 Heavy sedimentation evident; forested buffer absent; residential areas with associated impervious areas within 500' of channel; trash in channel; highly eroded area downstream

Primary Land Use		Upland Buffer		Floodplain-Channel	
	Forested	0	Forested (% Cover)		Connection: Overbank Flooding
	Agricultural		Agricultural	X	Evident
X	Residential	X	Managed Grass		Absent
X	Open Space/Vacant		Developed/Impervious		
	Industrial/Commercial		Vegetation Absent		Condition:
		X	Invasive Vegetation		Fair; Bank Instability Evident; Heavy Erosion and Incision Evident
					Encroachment:
	Adjacent Land Use:			X	Evident
	Residential, Commercial				Absent

	Water Quality		Man-Made Features		Wetlands		Channel Blockages
X	Cloudy, Turbid	U	Road Crossings		Present		Debris
	Obvious Odor		Utilities	X	Absent		Beaver Dam
	Residue Visible	X	Outfalls, Ditches				Other
			Pipes				
			BMPs				
			Dams				

